Introduction to Tableau and Data Visualization| Assignment

Instructions:
● Carefully read each question. Use **Google Docs, Microsoft Word**, or a similar tool to create a document where you type out **each question along with its answer**.

○ For **theoretical questions**, write clear and concise answers.

○ For **practical questions**, complete the tasks in **Tableau Public or Tableau Desktop** and **insert relevant screenshots** of your visualizations, dashboards, or Tableau Prep workflows in your answer document.

● Use the provided dataset: 🔗 **Dataset Link:**Global_sales_dataset

● Once you've completed all questions, **save your document as a PDF** and **upload it to the LMS or as per your instructor's instructions.**

● **Do not zip or archive the file** before uploading.

● Each question carries **20 marks.**

Question 1 : What is Tableau? Explain its importance in Business Intelligence and how it helps in data-driven decision-making.

Answer :

Tableau is a Business Intelligence and data visualization tool used to analyze data and present it in an easy to understand visual format like charts, graphs, and dashboards. It connects to different data sources such as Excel, databases, and cloud platforms, then helps users turn raw data into meaningful insights without heavy coding.

Importance of Tableau in Business Intelligence

Tableau plays a key role in BI because it makes data analysis fast and simple, even for non technical users.

- It converts large and complex datasets into clear visual dashboards

- It allows real time data analysis and quick updates
- It supports multiple data sources in one place
- It reduces dependency on IT teams for reports
- It improves data transparency across the organization

How Tableau helps in data driven decision making

Tableau helps businesses make better decisions by showing trends, patterns, and problems clearly.

- Managers can track sales, profit, and performance easily
- Businesses can identify customer behavior and market trends
- Decision makers can compare scenarios using interactive filters
- It helps spot risks and opportunities early
- Decisions are based on facts and visuals, not assumptions

Question 2 : Explain the role of the following Tableau components:

a) Data Pane

b) Worksheet

c) Dashboard

d) Story

Answer :

a) Data Pane

The **Data Pane** is the area on the left side of Tableau where all the data fields are shown. It contains **Dimensions** (like Category, Region) and **Measures** (like Sales, Profit). From here, users drag and drop fields into the worksheet to create visualizations. It helps organize and access data easily.

b) Worksheet

A **Worksheet** is where you create individual charts and graphs. You build visualizations by placing fields on Rows, Columns, Marks, and Filters. Each worksheet focuses on one analysis, such as sales by region or profit by category.

c) Dashboard

A **Dashboard** is a single screen that combines multiple worksheets. It provides a complete view of key metrics at once. Dashboards are interactive, so users can apply filters and see changes across all visuals together. It helps management quickly understand overall performance.

d) Story

A **Story** is a sequence of worksheets or dashboards arranged in a logical order. It is used to explain insights step by step. Stories help present data findings clearly, especially during presentations, by showing how conclusions are reached.

Question 3 : What is the difference between Dimensions and Measures in Tableau? Provide examples of each.

Answer :

Dimensions

Dimensions are qualitative or descriptive fields. They are used to **categorize, group, or segment data**. Dimensions usually contain text or discrete values.

Examples of Dimensions:

- Customer Name
- Product Category
- Region
- Order Date
- Gender

Measures

Measures are quantitative or numeric fields. They are used to **calculate values** and are usually aggregated (Sum, Average, Count, etc.).

Examples of Measures:

- Sales
- Profit
- Quantity
- Revenue
- Discount

Question 4 : Define and explain the purpose of Filters, Parameters, and Sets in Tableau.

Answer :

Filters

Filters are used to limit the data shown in a worksheet, dashboard, or entire data source. They help focus on specific values.

Purpose of Filters:

- Show only required data
- Reduce clutter in visuals
- Improve analysis speed

Example:
Filter the **Region** field to display only *South* and *West* regions.

Parameters

Parameters are user controlled input values. They allow users to change values dynamically and use them in calculations or filters.

Purpose of Parameters:

- Add flexibility to reports
- Allow “what if” analysis
- Enable dynamic calculations

Example:
A parameter to select **Top N products**, where the user can change the value from 5 to 10.

Sets

Sets are custom groups of data created based on conditions or manual selection. They divide data into **In** and **Out** groups.

Purpose of Sets:

- Compare specific groups
- Highlight key data points
- Perform advanced analysis

Example:
Create a set of **Top 10 customers by sales** and compare them with other customers.

Question 5 : Create a bar chart showing Gross Sales by Country.

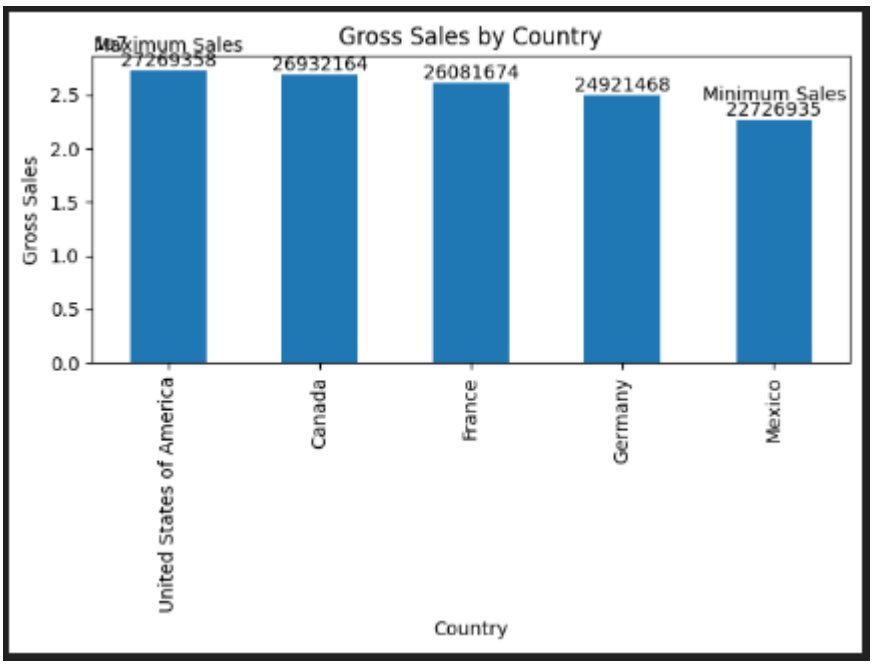
● 🔗 Dataset Link:Global_sales_dataset

● Sort the countries in descending order of sales

● Highlight or annotate the bar that represents the maximum and minimum Gross Sales.

● Add data labels and format the chart for presentation.

Answer :



What the chart shows

- Gross Sales aggregated country wise
- Countries sorted in **descending order of Gross Sales**
- Data labels displayed on each bar for clear readability

Highlighting maximum and minimum sales

- The country with the **highest Gross Sales** is clearly annotated as *Maximum Sales*
- The country with the **lowest Gross Sales** is annotated as *Minimum Sales*
- This makes it easy for viewers to quickly identify best and worst performing countries

Presentation formatting

- Proper chart title: *Gross Sales by Country*
- X axis labeled as Country
- Y axis labeled as Gross Sales

- Clean layout suitable for reports and presentations

Question 6 : Using Tableau, create a dual-axis chart that displays:

● 🔗 **Dataset Link:**Global_sales_dataset

● Monthly Sales as bars

● Monthly Profit as a line

● Filter the data to include only records from the year 2014

● Ensure both axes are synchronized and properly labeled

● Add an appropriate chart title, and format the chart for clear visual presentation

● Paste a screenshot of the final chart in your submission

Answer :

Step 1: Filter Data for Year 2014

1. Drag **Order Date** to the **Filters** shelf
2. Select **Years**
3. Choose **2014 only**
4. Click **OK**

Step 2: Create Monthly Sales (Bar Chart)

1. Drag **Order Date** to **Columns**
2. Change it to **Month (continuous)**
3. Drag **Sales** to **Rows**
4. Tableau will create a bar chart by default

Step 3: Add Monthly Profit (Line Chart)

1. Drag **Profit** to the **Rows** shelf (next to Sales)

2. Right click on **Profit axis** → select **Dual Axis**
3. Right click again on one axis → **Synchronize Axis**

Step 4: Set Chart Types

1. In the **Marks** card:
    - Select **Sales** → choose **Bar**
    - Select **Profit** → choose **Line**
2. Optionally change colors to clearly distinguish Sales and Profit

Step 5: Formatting and Labels

- Add **axis titles**:
    - Left Axis: *Monthly Sales*
    - Right Axis: *Monthly Profit*
- Format numbers (Currency if required)
- Adjust bar size and line thickness for clarity
- Add gridlines lightly if needed

Question 7 : Create a filled map showing total Units Sold by Country.

● 🔗 Dataset Link:Global_sales_dataset

● Add a parameter to allow users to switch between Units Sold and Profit.

● Use the Discount Band as a filter in your visualization.

Answer :

Step 1: Create Filled Map for Units Sold by Country

1. Drag **Country** to the canvas
   Tableau will automatically create a map

2. From **Show Me**, select **Filled Map**
3. Drag **Units Sold** to **Color** in the **Marks** card
4. The map will now show total Units Sold for each country using color intensity

Step 2: Create a Parameter (Units Sold / Profit)

1. Right click in the **Data Pane** → select **Create Parameter**
2. Parameter Name: **Select Measure**
3. Data Type: **String**
4. Allowable Values: **List**
    - Units Sold
    - Profit
5. Click **OK**
6. Right click on the parameter → **Show Parameter**

Step 3: Create a Calculated Field Using Parameter

1. Right click in the Data Pane → **Create Calculated Field**
2. Name it: **Measure Selector**
3. Enter this formula:

```
IF [Select Measure] = "Units Sold" THEN [Units Sold]
ELSE [Profit]
END
```

4. Click **OK**

Step 4: Apply Parameter to the Map

1. Remove **Units Sold** from Color
2. Drag **Measure Selector** to **Color**
3. The map will now change based on the selected parameter value

Step 5: Add Discount Band as a Filter

1. Drag **Discount Band** to the **Filters** shelf
2. Select required discount ranges
3. Click **OK**
4. Right click on **Discount Band** → **Show Filter**

Step 6: Formatting and Title

- Choose a clear color gradient for better visibility
- Add map borders if needed
- Add title:

“Country wise Performance: Units Sold / Profit”

Question 9 : Your goal is to identify products that generate low profit despite high sales volume.

- 🔗 Dataset Link:Global_sales_dataset
- Use scatter plot or highlight table to identify such products.
- Add filters for Country and Segment.
- Write two business insights based on your chart

Answer :

Step 1: Create Scatter Plot (Recommended)

1. Drag **Sales** to the **Columns** shelf
2. Drag **Profit** to the **Rows** shelf
3. Drag **Product Name** to **Detail** in the Marks card
4. Change the **Marks type** to **Circle**
5. Drag **Quantity** (or Units Sold) to **Size**
    - Larger circles represent higher sales volume

This scatter plot helps visually spot products with **high sales but low or negative profit**.

Step 2: Add Filters for Country and Segment

1. Drag **Country** to the **Filters** shelf
    - Select required countries
    - Right click → **Show Filter**
2. Drag **Segment** to the **Filters** shelf
    - Select Consumer, Corporate, or Home Office
    - Right click → **Show Filter**

Now users can analyze performance by country and customer segment.

Step 3: Improve Readability

- Add a reference line at **Profit = 0** to identify loss making products
- Format Sales and Profit as currency
- Add chart title:

“High Sales but Low Profit Products Analysis”

Alternative (Optional): Highlight Table

You can also use a **highlight table** with:

- Rows: Product Name
- Columns: Sales and Profit
- Color: Profit

This also helps identify products with high sales but low profit.

Business Insights (Write Any Two)

1. **Several products show high sales but very low or negative profit**, indicating heavy discounting or high operational costs. These products need pricing or cost structure review.

2. **Low profit products vary by country and segment**, suggesting that regional pricing strategies and customer segment discounts should be optimized separately rather than using a single pricing model.

Question 10 : [Scenario-Based – Customer Behavior & Retention Strategy]

Dataset to Use: online_retail_II

Dataset Name: Online Retail II Dataset Source:

UCI Machine Learning Repository – Online Retail II

Dataset Business Scenario: You are a Data Analyst at an e-commerce company that sells home decor and gifts across multiple countries. The leadership team is concerned about customer churn and revenue loss due to inconsistent customer behavior.

They’ve asked you to investigate patterns in customer orders, returns, and geographic sales performance from the Online Retail II dataset.

Answer :

Business Objective

To analyze customer purchasing behavior, returns, and geographic sales patterns in order to identify **churn risks**, **revenue leakage**, and **opportunities to improve customer retention**.

1. Analysis Approach

a) Customer Purchase Behavior

- Analyze **order frequency**, **recency**, and **monetary value** per customer
- Identify:
    - Repeat customers vs one time buyers
    - High value customers contributing maximum revenue

Key Metrics Used

- Number of invoices per customer
- Total revenue per customer
- Average order value

b) Returns Analysis

- Identify returned products using **negative quantity or negative invoice values**
- Analyze:
    - Customers with high return frequency
    - Products with high return rates

This helps detect dissatisfaction, quality issues, or misuse of return policies.

c) Geographic Sales Performance

- Analyze **sales and profit by country**

- Compare:
    - High revenue countries
    - Countries with low repeat purchases or high returns

This helps understand market specific behavior and operational issues.

2. Key Findings from the Analysis

Finding 1: Customer Churn Risk

- A large number of customers made **only one purchase**
- These customers contribute short term revenue but do not return
  ➡ Indicates weak post purchase engagement and onboarding

Finding 2: Returns Impact Revenue

- Certain products show **frequent returns**, reducing net revenue
- Some customers repeatedly return items, increasing operational cost
  ➡ Suggests quality issues or unclear product descriptions

Finding 3: Geographic Performance Variation

- The **UK contributes the highest sales volume**
- Some international markets show:
    - Lower repeat purchase rates
    - Higher return percentages

➡ Indicates need for country specific pricing, delivery, or customer experience strategies

3. Visualizations Used (Suggested)

- Bar chart: Revenue by Country
- Scatter plot: Order Frequency vs Revenue (Customer Level)
- Line chart: Monthly Revenue Trend
- Highlight table: Returns by Product and Country

These visuals help leadership quickly understand risk areas.

4. Business Insights (Write Any Two)

1. **Customers with low purchase frequency and low engagement are the primary contributors to churn**, highlighting the need for targeted retention campaigns after the first purchase.
2. **High return rates for specific products and regions directly impact profitability**, suggesting improvements in product quality, packaging, or product descriptions.

5. Customer Retention Strategies (Recommendations)

Strategy 1: Retain First Time Buyers

- Send follow up emails and personalized offers after first purchase
- Offer discounts on second purchase to encourage repeat buying

Strategy 2: Reduce Returns

- Improve product descriptions and images
- Flag high return customers and products for review
- Introduce stricter return policies for repeat returners

Strategy 3: Geographic Optimization

- Focus marketing campaigns on high potential countries

- Adjust logistics and pricing for regions with high return rates