POWER BI ASSIGNMENT

Question 1 : Define Power BI and What are the key components of the Power BI ecosystem? Briefly explain: ● Power BI Desktop ● Power BI Service ● Power BI Mobile ● Power BI Gateway

What is Power BI

Power BI is a business intelligence tool developed by Microsoft that is used to analyze data and present it in the form of reports and dashboards. It helps organizations understand their data better

Key Components of the Power BI Ecosystem

The Power BI ecosystem mainly includes Power BI Desktop, Power BI Service, Power BI Mobile, and Power BI Gateway. These components work together to collect, analyze, publish, and share data insights.

Power BI Desktop

Power BI Desktop is a Windows application used to create reports. It allows users to connect to different data sources, clean and transform data, create calculations using DAX, and design visual reports. Once the report is ready, it can be published to Power BI Service.

Power BI Service

Power BI Service is an online, cloud-based platform where reports created in Power BI Desktop are published. It is used to share reports and dashboards with others, collaborate with teams, and refresh data automatically.

Power BI Mobile

Power BI Mobile is a mobile app that allows users to view dashboards and reports on smartphones and tablets. It helps users monitor important data and insights anytime and anywhere.

Power BI Gateway

Power BI Gateway is used to connect on-premises data sources to Power BI Service. It enables secure data transfer and allows scheduled data refresh without moving data permanently to the cloud.

Question 2 : Compare the following Power BI visuals: ● Pie Chart vs Donut Chart ● Bar Chart vs Column Chart When would you prefer one over the other? Give one example for each pair.

Pie Chart vs Donut Chart

Pie Chart

A pie chart shows how different parts contribute to a whole using slices of a circle. It is easy to understand when there are very few categories and the differences are large.

When to use:

When you want to show simple percentage distribution Best with 3–5 categories only

Example: Showing the percentage of total sales by region (East, West, Central, South).

Donut Chart

A donut chart is similar to a pie chart but has a hole in the center. It looks more modern and allows space in the center to display totals or labels

When to use:

When you want a cleaner, more visually appealing chart

Useful when you want to display a total value in the center

Example:

Showing profit contribution by product category, with total profit displayed in the center.

Preference

Use a pie chart for quick, simple comparisons

Use a donut chart when you want better design and extra information in the center

Bar Chart vs Column Chart

Bar Chart

A bar chart displays data using horizontal bars. It is useful when category names are long or when comparing many categories.

When to use:

When category labels are long When there are many categories

Example:

Comparing sales by product sub-category (Tables, Chairs, Bookcases, Accessories).

Column Chart

A column chart displays data using vertical bars. It is commonly used for time-based or category comparisons.

When to use:

When comparing values over time When category names are short

Example:

Showing monthly sales trend from January to December.

Preference

Use a bar chart for readability with many or long categories

Use a column chart for trends and clean comparisons

Question 3 : Explain the significance of: ● Star schema vs Snowflake schema ● Primary key vs Foreign key in relationships (Power BI) Why is cardinality important?

Answer :

Star Schema vs Snowflake Schema

Star Schema

In a star schema, a central fact table is connected directly to dimension tables.

The structure looks like a star, with the fact table in the center.

It is simple, easy to query, and fast for reporting.

Example:

Fact table: Sales (columns: Order ID, Product ID, Sales Amount)

Dimension tables: Product, Customer, Region

Snowflake Schema

In a snowflake schema, dimension tables are normalized into multiple related tables.

It looks like a snowflake, with branches extending from dimensions.

Reduces data redundancy but is slightly more complex and slower to query.

Example:

Product dimension is split into: Product → Product Category → Product Sub-Category

Significance

Star schema: Best for simple reporting and fast performance.

Snowflake schema: Useful for detailed, normalized data models where storage optimization matters.

Primary Key vs Foreign Key

Primary Key (PK)

A column (or set of columns) that uniquely identifies each row in a table

Ensures no duplicate values.

Example:

CustomerID in Customer table

Foreign Key (FK)

A column in one table that refers to the primary key in another table.

Creates a relationship between tables.

Example:

CustomerID in Sales table pointing to CustomerID in Customer table

Cardinality in Power BI Relationships

Cardinality describes the nature of relationships between tables:

Type Meaning

One-to-Many (1:*) One row in the primary table relates to many rows in the related table (most common)

Many-to-One (*:1) Opposite of above

Many-to-Many (:) Multiple rows in one table relate to multiple rows in another

Why it matters:

Correct cardinality ensures accurate aggregation and calculations.Wrong cardinality can cause double counting or missing data in reports.

Question 4 : Differentiate between: ● Calculated column vs Measure Also, define Row context and Filter context with simple examples.

Answer :

Calculated Column vs Measure

Feature Calculated Column Measure

Computation Row by row (for each row in the table) On aggregated data (depends on filters)

Stored in Table? Yes No (calculated on the fly)

Example Profit Margin % = [Profit]/[Sales] for each row Total Profit = SUM([Profit])

Key idea:

Column: one value per row

Measure: one value for the current filter/selection

Row Context

Refers to the current row when a formula is calculated.

Used in calculated columns.

Example:

Profit Margin = [Profit] / [Sales]

Each row calculates its own profit margin → row context.

Filter Context

Refers to the filters applied to a measure, like slicers or visual filters.

Used in measures.

example:

Total Profit = SUM([Profit])

If you filter for Region = East, Total Profit only sums East region sales → filter context.Quick tip to remember:

Row context = row-level calculations (columns)

Filter context = report/visual-level calculations (measures)

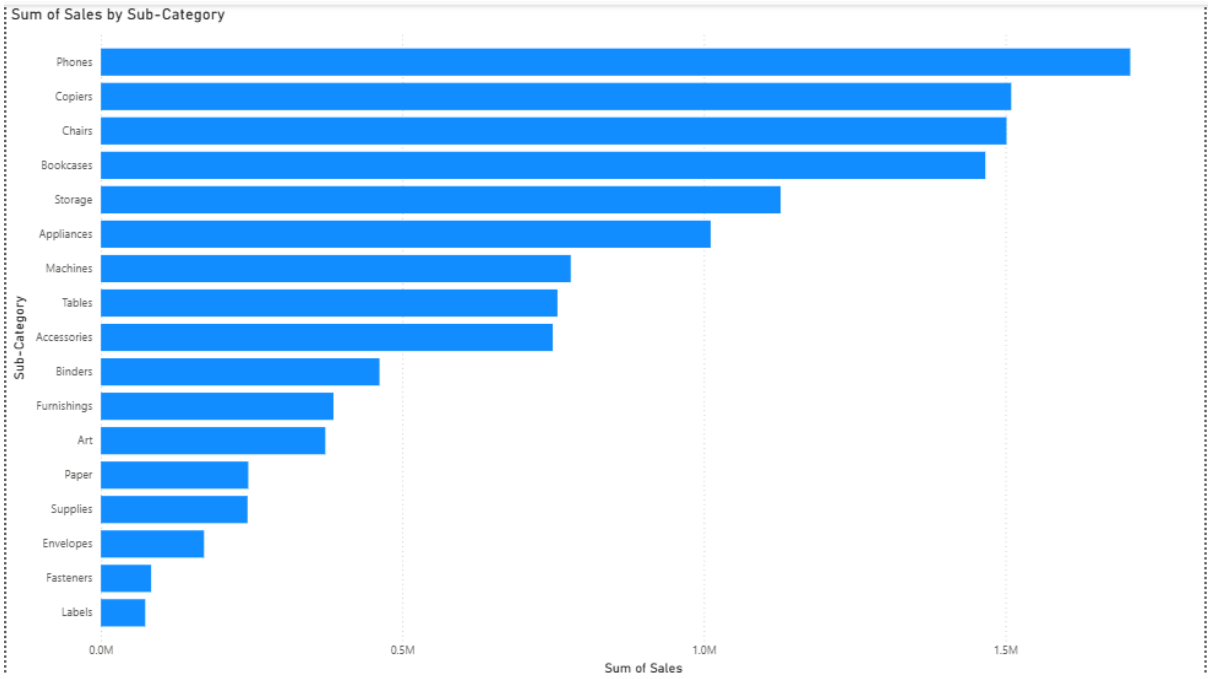
Question 5: What is the difference between a report and a dashboard in Power BI?

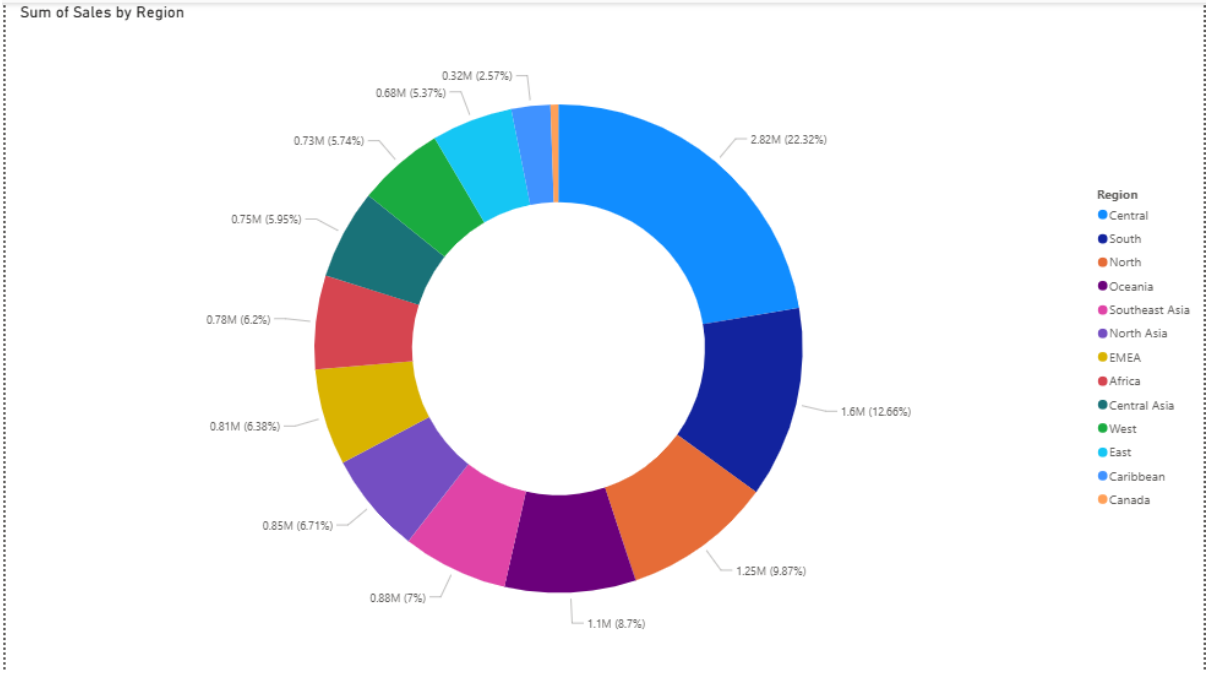
Answer

A report in Power BI is a detailed set of visualizations, usually spanning multiple pages, that allows users to explore data, apply filters, and drill down into details. Reports are mainly used for in-depth analysis of a dataset. On the other hand, a dashboard is a single-page collection of key visuals or tiles that provides a quick overview of important metrics. Dashboards are used for monitoring KPIs at a glance and can combine visuals from multiple reports or datasets. In short, reports are for analysis, while dashboards are for quick insights and decision-making.

Question 6 : Using the Sample Superstore dataset: ● Create a Clustered Bar Chart to display Total Sales by Sub-Category ● Create a Donut Chart for Sales % by Region Provide screenshots of both visuals. DATASET LINK : Global_superstore2

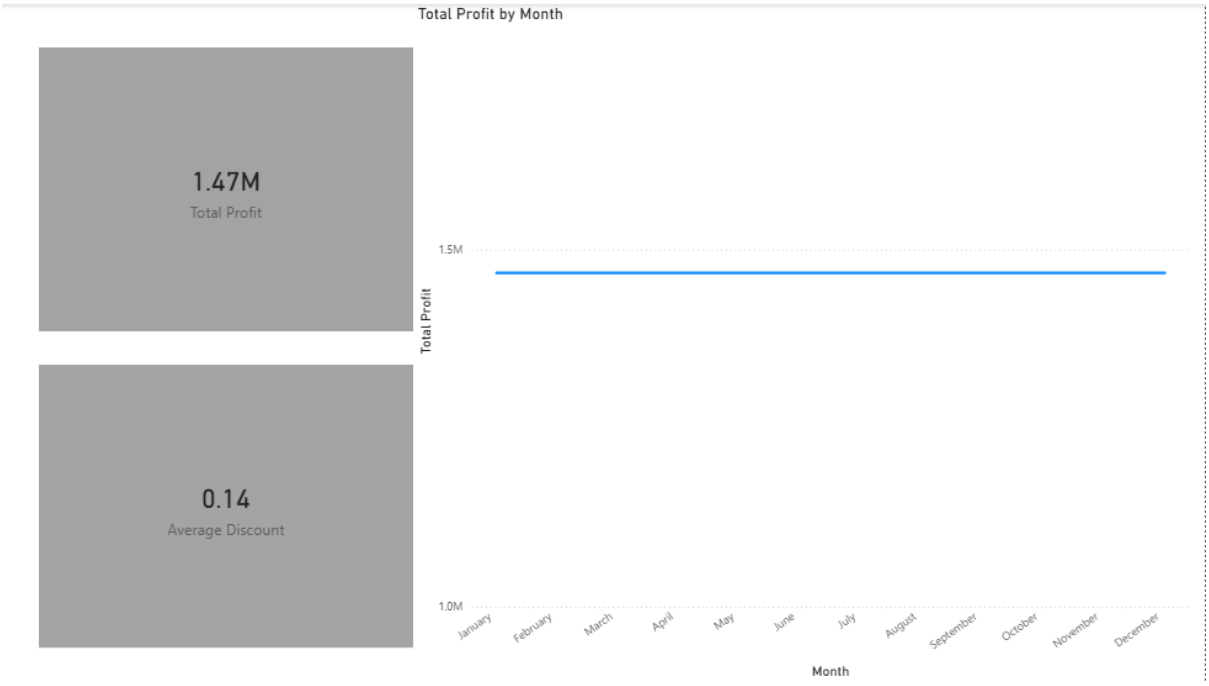
Answer :





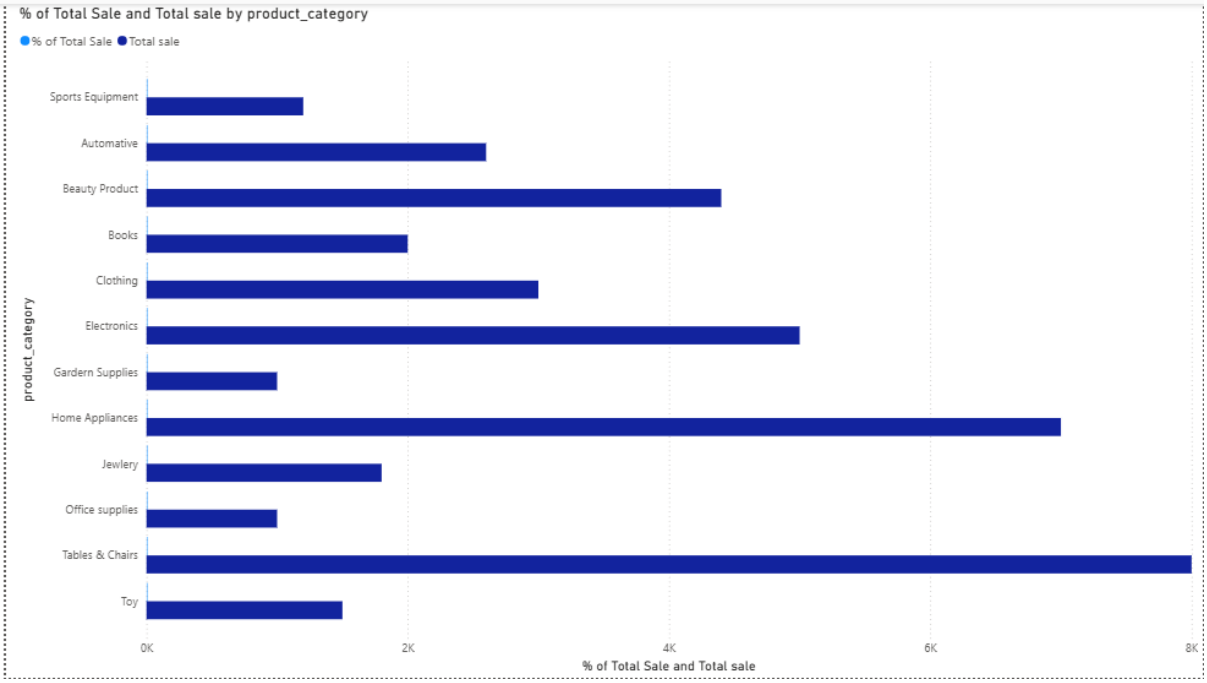
Question 7 : Write and apply the following measures: ● Total Profit = SUM([Profit]) ● Average Discount = AVERAGE([Discount]) Display both in a KPI Card, and use a Line Chart to show profit trend over months. Add visuals and DAX formulas. DATASET LINK : Global_superstore2

Answer :



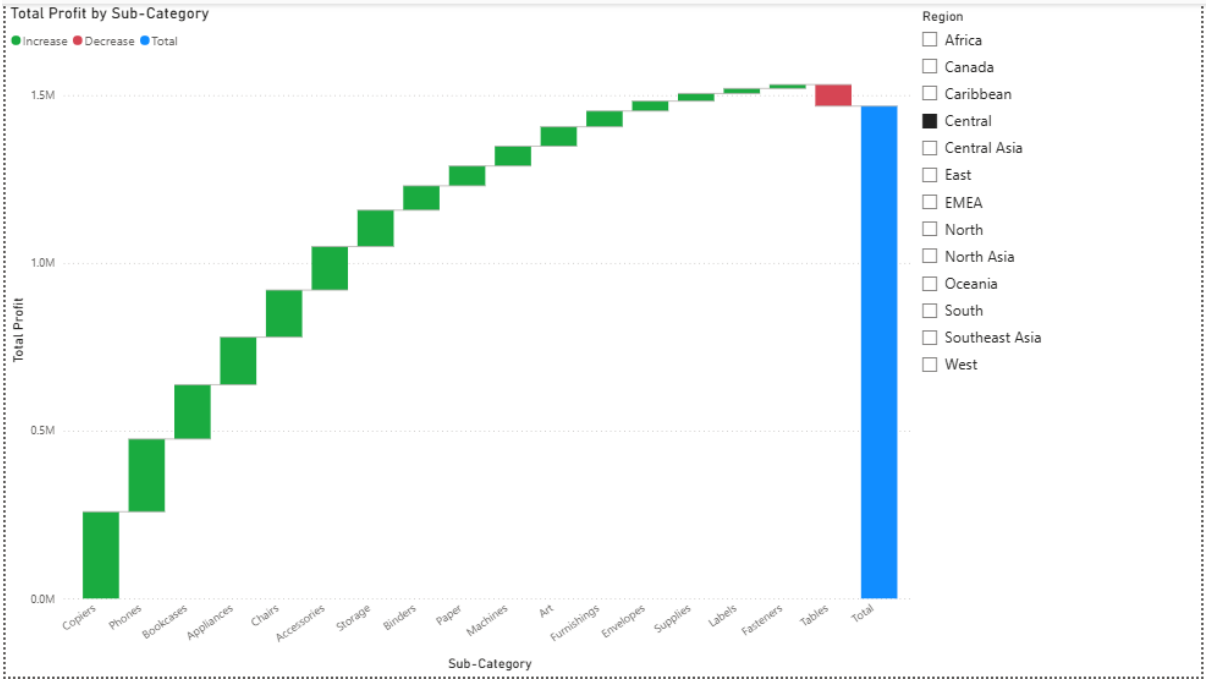
Question 8 : Implement a DAX measure that calculates the percentage of total sales by product category. Product_category Sales_Amount Electronics 5000 Clothing 3000 Home Appliances 7000 Books 2000 Tables & Chairs 8000 Toy 1500 Sports Equipment 1200 Office Supplies 1000 Beauty Products 4400 Garden Supplies 1000 Jewelry 1800 Automative 2600

Answer :



Question 9 : ● Create a DAX Measure for Total Profit ● Use it in a Waterfall Chart to analyze how different Sub-Categories contribute to overall profit ● Add a Slicer for Region to filter the visual ● Write brief business insights (4–5 lines) from the chart and provide 2–3 data-driven recommendations to improve profit. Provide a steps, screenshot of the Waterfall chart and the DAX formula DATASET LINK : Global_superstore2

Answer :



The Waterfall chart highlights that certain sub-categories such as Technology and Office Supplies contribute positively to overall profit, while others like Tables and Bookcases show negative profit impact. Profit contribution varies significantly across regions, indicating regional demand differences. Loss-making sub-categories consistently reduce net profitability. The analysis reveals that not all high-sales categories are profitable, emphasizing the importance of margin management.

✓ Recommendation 1:

Focus on expanding high-profit sub-categories by improving inventory availability and targeted promotions.

✓ Recommendation 2:

Re-evaluate pricing, supplier costs, or discount strategies for loss-making sub-categories to reduce profit erosion.

✓ Recommendation 3:

Adopt region-specific strategies, as profitability patterns vary across regions, to maximize local market performance.

Question 10 : Scenario: VitaTrack Wellness, a digital health company in FitZone, has collected data on users' daily habits and health vitals. The analytics team is tasked with drawing actionable insights from this data to improve lifestyle suggestions and prevent heart-related risks. Your Task: Using the provided dataset (includes Age, Gender, BMI, Steps, Calories, Sleep, Heart Rate, Blood Pressure, Smoking, Alcohol, Exercise, Diabetic & Heart Disease status): Build a one-page Power BI dashboard that answers: 1. Are users maintaining a balanced lifestyle (Steps, Sleep, Calories) 2. What lifestyle patterns (Smoking, Alcohol, BMI, etc.) indicate heart disease risk? 3. Is there any visible relationship between Sleep and Physical Activity? 4. How does BMI vary across Age Groups and Genders? 5. What is the impact of smoking and alcohol on heart rate and blood pressure? 6. Segment people based on their health activity to suggest lifestyle changes DATASET LINK: Health_activity_data

Answer: