Data Analysis

Analysis: data analysis of Sample Superstore spreadsheet: identify and document the level of completeness, inconsistencies, redundancies, duplicates. Sample Superstore is the data source you will use to generate your reports (available on D2L/Course Materials

LEGEND:	Mandatory Fields used by the Group (for Operational and Executive Reports)
	Order ID
	Order Date
	Country/Region
	City
	State
	Region
	Product ID
	Category
	Sub-Category
	Sales
	Quantity
	Discount
	Profit

Completeness Metrics:

Metrics	Description	Score	Remarks	Comments
Field Completeness	Percentage of mandatory fields or attributes that are populated in a document.	100%	All mandatory fields has complete information	NA
Record Completeness	Percentage of records or rows in a dataset that have complete information for all relevant fields.	100%	All mandatory fields has complete information	**Field:** **"Postal Code" is missing 11 values** **Impression:** **Field "Postal Code" is NOT a mandatory field for generating Operational and Executive Report. Missing values can be ignored.**

Inconsistencies Metrics:

Metrics	Description	Score	Remarks	Comments
Data Type Validation	Data alignment to the expected data types	100%	All mandatory fields followed the expected data types	NA
Domain Validation	Data alignment to the expected value domains or ranges	100%	All mandatory fields followed the expected domains or ranges	NA
Pattern Matching	Data adherance to expected data format (i.e email and phone numbers)	66.67% (2 out of 3)	The following field/s with the following expected format was followed consistently: **Field:** **Customer ID** - <First and Last Name Initials>-<Customer No.> **Product ID** - <First 3 characters of Category>-<First 2 characters of Sub-category>-<Product No.>	The following field/s with the following expected data format was NOT followed consistently: **Field:** **Order ID** - Format: <Country Code>-<Year of Purchase>-<Order No.> **Impression:** Some of the orders came from country United States (Country Code: US) but Order ID generated starts with CA

Redundancies Metrics:

Metrics	Description	Score	Remarks	Comments
Duplicate Records	Identification of duplicate records by comparing combinations of fields	100% (NO relevant redundant entries)	ALL fields except for **Sales, Quantity and Profit** are showing expected redundant entries as the spreadsheet is about the Inventory of Purchases	NA
Field Redundancy	Occurance or number of times a specific field contains the same value across records			
Text Similarity	Comparison of the similarity of textual content in fields			

Duplicates Metrics

Metrics	Description	Score	Remarks	Comments
Duplicate Detection Rate	Percentage of duplicates identified compared to the total records in the dataset	100% (NO relevant duplicate entries)	ALL fields except for **Sales, Quantity and Profit** are showing expected redundant entries as the spreadsheet is about the Inventory of Purchases	NA
False Positives	Percentage of records flagged as duplicates that are not actual duplicates			
False Negatives	Percentage of actual duplicates that were not identified			

Operational Report - Information:

Context and Additional Assumptions: describe the context in which your reports will be created, maintained, and used, and any additional assumptions you need to develop the operational and the executive reports.

Additional Assumptions on Operational and Executive Report

Assumption-based Data Column Addition:

For the enhanced financial and sales performance metrics, we added some additional columns on the source data based on the certain assumptions. Assumptions and calculation of the new columns are listed below:

1. We assume amount in the "Sales" column is the combination of cost of goods sold, cost of sales, other expenses, profit, and discount. Thus, we are defining sale column as,
   a. Cost of Goods Sold (COGS) + Cost of Sales + Profit + Other Expenses - Discounts = Sales Revenue
2. In addition to that, we assume for every sale, after excluding profit and discount, COGS will contribute to 2x of the sale amount and Cost of sales and other expense will contribute to x/2 of the sale amount. For example,
   a. If sale=100%, discount is 1% and profit after discount is 15%, then remaining 85% of value will be splitted to COGS, Cost of sales, and for the other expenses.
   b. Where COGS will contribute to (85/3)*2 = 56.67% of sales value, Cost of sales will contribute to (85/3)*1 = 28.34% of sales value, and other expense will contribute to (85/3)*1 = 28.34% of sales value.
3. By defining above calculation, we are adding three new columns in the source data that is listed below:
   a. Cost of Goods Sold(COGS)
   b. Cost of sales
   c. Other Expenses
4. Metrics and comparisons will be derived from these new columns as well for both operational and executive report.

Metrics Used in the Operational and Executive Report

Metric Name	Metric type	Formula	Description
Total Sales	Simple	Sum of sales across category and region	It represents addition of sales value across category and region
Total Quantity	Simple	Sum of quantities across category and region	It represents addition of quantity across category and region
Total Profit	Simple	Sum of profits across category and region	It represents addition of profits across category and region
Gross Margin Ratio	Financial	(Sales - COGS / Sales) * 100	It shows how much profit you have after covering product costs.
Net Margin Ratio	Financial	((Gross Profit - Other Expenses - Discounts) / Sales) * 100	It reveals the percentage of sales that turns into profit after all expenses.
Sales Effectiveness Ratio	Sales	(Sales Revenue / Cost of sales)*100	It measures how effective your sale is, in percentage terms.
Sales Growth Rate	Sales	[(Current Period Sales - Previous Period Sales) / Previous Period Sales] * 100	It tells you the percentage change in your sales compared to a previous period.
Return Rate (%)	Returns	(Total Quantity Returned / Total Quantity Sold) * 100	It shows the portion of sold items that customers send back.
Profit Margin on Returns	Returns	(Profit on Returned Items / Total Sales Revenue from Returned Items) * 100	It reveals the profit you make from items that customers return.
Order-to-Ship Time	Shipping	Ship Date - Order Date	It measures how long it takes to deliver an order after it's placed.
Average Order Processing Time	Shipping	(Sum of Order-to-Ship Times / Number of Orders)	It shows the typical time it takes to handle an order from start to shipment.

Operational and Executive Data Management

1. In charge with Business Requirements and Data Needs
a. Overseeing business requirements and data needs is a crucial role within organization.
b. Responsibilities
     i. Understanding Business Goals
     ii. Quality Assessment of Data
     iii. Analyzing Requirements
     iv. Converting Business Requirement into Data Needs
     v. Collecting Data
2. In charge with Data Quality Guidelines
a. Ensuring that data is collected, stored and used within an organization that will be accurate , complete and consistent
b. Responsibilities
     i. Defining the Quality standards
     ii. Data Governance
     iii. Data Profiling
     iv. Cleaning of Data
3. Data Ownership
a. Is an essential aspect in data governance
b. Responsible in controlling, managing and making decisions how data is collected and stored
c. Key aspects of data ownership
     i. Legal rights
     ii. Data Management
     iii. Data Privacy
     iv. Data Sharing
4. In charge with Metadata Management
a. Involves the organization and management of metadata
b. Mainly responsible for ensuring that data is well-documented
c. Key aspects of metadata management
     i. Metadata includes technical metadata and business metadata
     ii. Requires collaboration with data stewards, data owners, and data users
     iii. Metadata management supports data discovery, data lineage tracking and compliance efforts.
2. In charge with Data Access Management
a. involves controlling and managing who has access to specific data resources
b. Responsibilities
     i. ensuring data security, compliance with regulations and proper utilization of data
     ii. collaborating closely with IT security teams to implement robust data access controls
     iii. balancing the need for data access with data security and privacy requirements
3. In charge of technical aspects of data storage, integration and administration
a. Focuses on the technical infrastructure and processes for storing, integrating, and administering data
b. Key aspects of data storage, integration and administration
     i. encompasses database management, data warehousing, ETL (Extract, Transform, Load) processes and cloud storage solutions
     ii. ensures data scalability
     iii. includes data backup and recovery procedures, data archiving and disaster recovery planning

Report type:	Operational Report
Report name:	Performance Report By Region
Frequency of the report	Every Month
Target Audience:	Divisional Manager, Area Manager, Director of Operations
Intended Use	Below are the intended use

Sales Team Operations by Month
Jan 2021

Region	Regional Manager	Category	Simple			Fianncial		Sales		Returns		Shipping
			Total Sales	Total Quantity	Total Profit	Gross Margin Ratio	Net Margin Ratio	Sales Effectiveness Ratio	Sales Growth Ratio	Return Rate	Profit Margin on Returns	Avg. Order Processing Time (Days)
Central	Roxanne Rodriguez	Furniture	$2,230.01	35	-$256.18	18.62%	-22.19%	656.83%	13.01%	0.00%	0.00%	4.00
		Office Supplies	$12,704.29	149	$1,724.88	10.68%	-36.00%	721.67%	8.21%	0.00%	0.00%	4.00
		Technology	$6,756.36	40	$1,397.23	44.81%	17.14%	749.81%	3.34%	0.00%	0.00%	5.27
	Total		$21,690.66	224	$2,865.93	18.14%	-24.16%	716.12%	7.33%	0.00%	0.00%	4.23
East	Chuck Magee	Furniture	$1,213.66	14	-$30.29	32.46%	-1.53%	641.67%	5.43%	0.00%	0.00%	4.60
		Office Supplies	$2,972.22	42	$321.90	41.29%	11.41%	829.06%	4.45%	0.00%	0.00%	4.21
		Technology	$1,197.41	20	$64.26	20.24%	-19.78%	584.30%	6.45%	0.00%	0.00%	3.80
	Total		$5,383.28	76	$355.87	35.07%	2.22%	739.03%	5.56%	0.00%	0.00%	4.21
South	Fred Suzuki	Furniture	$481.86	8	-$43.65	34.25%	1.35%	711.99%	23.40%	0.00%	0.00%	5.00
		Office Supplies	$578.20	65	$9.71	-0.79%	-56.62%	558.77%	45.24%	10.91%	20.49%	4.29
		Technology	$3,755.53	16	$744.25	24.50%	-13.94%	566.80%	3.32%	2.98%	6.25%	3.00
	Total		$4,815.59	89	$710.30	7.77%	-42.28%	575.70%	29.01%	3.64%	11.38%	4.10
West	Sadie Pawthorne	Furniture	$2,038.51	29	$290.68	41.05%	11.54%	737.03%	4.01%	7.78%	-0.48%	3.00
		Office Supplies	$5,019.59	139	$1,203.96	47.21%	20.26%	836.10%	2.23%	0.43%	37.64%	4.09
		Technology	$5,023.75	40	$1,713.70	37.80%	6.62%	704.95%	2.21%	4.78%	11.00%	4.00
	Total		$12,081.84	208	$3,208.33	44.28%	16.04%	793.38%	2.55%	3.48%	8.04%	3.92
Grand Total			$43,971.37	597	$7,140.44	27.85%	-9.45%	726.47%	5.01%	1.35%	9.02%	4.11

SIMPLE REPORT

Revenue Insights:
Sales reports will provide an overview of revenue generated over a month. Analyzing sales trends will help identify peak seasons, sales cycles, and areas for revenue growth.

Product Performance:
By breaking down sales by product category, Target Audience can identify the top-performing and underperforming categories. This information will help in making informed decisions about product development and marketing strategies.

Market and Customer Analysis:
Sales Reports can highlight regions or customer segments which contribute significantly to the revenue. Understanding where sales are strong or weak can guide marketing and sales efforts.

Sales Team Performance:
Sales Report can help assess the effectiveness and guide sales training and incentive programs.

FINANCIAL REPORT

Financial Performance, Profitability, and Operational Efficiency
Finacial Report is used to evaluate the efficiency of production processes, pricing strategies, and changes in the cost of goods sold. It can help identify areas where cost reduction or pricing adjustments may be needed.

Financial Report will help assess the impact of operating expenses, taxes, and interest on the bottom line. Changes in the Net Margin Ratio can indicate the effectiveness of cost management and growth strategies.

SALES REPORT

Provide Insights into a company's sales performance and efficiency
Sales Report will be used to monitor how efficiently the company's assets, such as inventory, equipment, and working capital, contribute to sales revenue. It can highlight the need for improved inventory management, more effective sales strategies, or better capital allocation.

RETURNS REPORT

Evaluation and Management of the Shipping Processes
Returns Report will help measures the total time taken from the moment a customer places an order to the point when the order is shipped and ready for delivery.

Returns Report will also help measure the average time taken to process a customer order, excluding the time required for shipping and delivery.

SHIPPING REPORT

Evaluation and Management of the Shipping Processes
Shipping Report is to help assess the speed and efficiency of the order fulfillment process. It helps in monitoring how quickly customer orders are processed and shipped after they are received.

Report type:	**Executive Report**
Report name:	**Performance Report per Quarter**
Frequency of the report	**Every Quarter (or every 3 months)**
Target Audience:	**Chief Executive Officer (CEO) and Chief OPerating Officer (COO)**
Intended Use	**Below are the intended use**

Verticals	Metrics	Q1vsQ2	Q2vsQ3	Q3vsQ4	Q4vsQ1
	Gross Margin Ratio	3.20%	3.10%	-1.15%	5.32%
Financial	Net Margin Ratio	1.20%	0.56%	-0.15%	3.32%
	Sales Effectiveness Ratio	5.34%	4.34%	1.34%	6.55%
Sales	Sales Growth Rate	3.34%	3.01%	2.01%	4.01%
	Return Rate (%)	0.10%	0.25%	1.20%	0.46%
Returns	Profit Margin on Returns	-0.13%	-0.39%	-3.43%	-0.99%
Shipping	Average Order Processing Time	2 days	2.5 days	3 days	1.5 days
	Top Region	Central	Central	East	South

FINANCIAL REPORT

Financial Performance
Financial Report will help to measure the profitability of a company's core business operations, excluding operating expenses and taxes. It will help identify how efficient a company is generating profit from its production or sale of goods.

Financial Report will also help assess the overall profitability of a company, taking into account all operating expenses, interest expenses, taxes, and other costs.

Verticals	Metrics	Q1vsQ2	Q2vsQ3	Q3vsQ4	Q4vsQ1
	Gross Margin Ratio	3.20%	3.10%	-1.15%	5.32%
Financial	Net Margin Ratio	1.20%	0.56%	-0.15%	3.32%
	Sales Effectiveness Ratio	5.34%	4.34%	1.34%	6.55%
Sales	Sales Growth Rate	3.34%	3.01%	2.01%	4.01%
	Return Rate (%)	0.10%	0.25%	1.20%	0.46%
Returns	Profit Margin on Returns	-0.13%	-0.39%	-3.43%	-0.99%
Shipping	Average Order Processing Time	2 days	2.5 days	3 days	1.5 days
	Top Region	Central	Central	East	South

SALES REPORT

Evaluation and Management of Sales Team
Sales Report will help measure how effective the sales team in utilizing its resources and efforts to generate revenue. It will help assess the efficiency of the sales process.

Financial Report will also help assess the rate at which sales revenue is increasing. It will help in tracking sales performance trends and setting growth targets.

Verticals	Metrics	Q1vsQ2	Q2vsQ3	Q3vsQ4	Q4vsQ1
	Gross Margin Ratio	3.20%	3.10%	-1.15%	5.32%
Financial	Net Margin Ratio	1.20%	0.56%	-0.15%	3.32%
	Sales Effectiveness Ratio	5.34%	4.34%	1.34%	6.55%
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Returns	Profit Margin on Returns	-0.13%	-0.39%	-3.43%	-0.99%
Shipping	Average Order Processing Time	2 days	2.5 days	3 days	1.5 days
	Top Region	Central	Central	East	South

RETURNS REPORT

Evaluation and Management of Return Process
Returns Report will help assess the frequency and magnitude of returns, by identifying trends and issues related to product quality, customer satisfaction, and operational efficiency.

Returns Report will also help understand the cost and revenue implications of returns, helping in decision-making related to restocking, refurbishing, or disposal of returned products.

Verticals	Metrics	Q1vsQ2	Q2vsQ3	Q3vsQ4	Q4vsQ1
	Gross Margin Ratio	3.20%	3.10%	-1.15%	5.32%
Financial	Net Margin Ratio	1.20%	0.56%	-0.15%	3.32%
	Sales Effectiveness Ratio	5.34%	4.34%	1.34%	6.55%
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Shipping	Average Order Processing Time	2 days	2.5 days	3 days	1.5 days
	Top Region	Central	Central	East	South

SHIPPING REPORT

Evaluation and Management of the Shipping Processes
Shipping Report is to help assess the speed and efficiency of the order fulfillment process. It helps in monitoring how quickly customer orders are processed and shipped after they are received.

Shipping Repprt is to help evaluate the efficiency of the internal processes involved in order handling, including order verification, picking, packing, and quality checks.