1. Time Series Analysis

- **Monthly/Quarterly/Yearly Sales Trends**: Analyze how sales fluctuate over time.
- **Seasonality**: Check if certain months/quarters have higher sales (e.g., holiday seasons).
- **Profit vs. Sales Over Time**: Compare if higher sales always mean higher profit.
- **Order-to-Ship Delay Analysis**: Calculate the average time between Order Date and Ship Date and see if delays impact sales/profit.

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2. Customer Segmentation & Behavior

- **RFM Analysis (Recency, Frequency, Monetary)**:
  - **Recency**: When was the last purchase of each customer?
  - **Frequency**: How often do customers buy?
  - **Monetary**: How much do they spend?
- **Top Customers by Profit/Sales**: Identify high-value customers.
- **Customer Churn Analysis**: Check if some customers stopped purchasing over time.

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3. Product & Category Performance

- **Best/Worst Selling Products**: Rank by Sales, Profit, or Quantity.
- **Discount Impact**: Does higher discount lead to more sales but lower profit?
- **Sub-Category Analysis**: Which sub-categories (e.g., Sedans, SUVs) contribute most to profit?
- **Product Bundling (Market Basket Analysis)**: Check if certain products are often bought together (using association rules).

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4. Geographic Analysis

- **Top States/Cities by Sales & Profit**: Visualize on a map (if possible).

- **Region-wise Performance**: Compare Region in terms of sales, profit, and discounts.
- **Shipping Mode Preference by Region**: Do certain regions prefer specific Ship Mode?

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5. Profitability & Cost Analysis

- **Discount vs. Profit Correlation**: Does discounting hurt profitability?
- **Break-even Analysis**: Find the optimal discount level that maximizes profit.
- **Loss-making Products**: Identify products with negative Profit.

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6. Shipping & Logistics Analysis

- **Ship Mode Efficiency**: Which Ship Mode is fastest and most cost-effective?
- **Shipping Time vs. Customer Satisfaction**: Hypothesize if longer shipping times reduce repeat purchases.

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7. Predictive Analysis (If Possible)

- **Sales Forecasting**: Use time series models (e.g., ARIMA, Prophet) to predict future sales.
- **Profit Prediction**: Train a regression model to predict profit based on features like Discount, Quantity, Category, etc.

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8. Anomaly Detection

- **Outliers in Sales/Profit**: Detect unusually high or low values that may need investigation.
- **Fraud Detection (if applicable)**: Check for abnormal discount usage or returns.

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9. Business Questions to Answer

- **Which customer segment (**Segment**) is most profitable?**

- **Are discounts driving sales at the expense of profit?**
- **Which regions need improvement in sales/profit?**
- **Is there a relationship between** Quantity **and** Discount**?**

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10. Visualizations to Include

- **Heatmaps** (e.g., correlation between Sales, Profit, Discount).
- **Bar Charts** (e.g., top products by profit).
- **Line Charts** (e.g., monthly sales trends).
- **Scatter Plots** (e.g., Discount vs. Profit).
- **Geospatial Maps** (if coordinates are available).

Tools/Libraries to Use

- **Pandas** (for aggregations and transformations).
- **Matplotlib/Seaborn** (for visualizations).
- **Plotly** (for interactive visualizations).
- **Scikit-learn** (for predictive modeling, if needed).

Final Deliverable

Structure your notebook as:

1. **Business Objective**
2. **Data Cleaning (if any remaining)**
3. **Exploratory Analysis (Summary of EDA)**
4. **Advanced Analysis (Pick 3-5 of the above)**
5. **Key Findings & Recommendations**