ANALYZING THE IMPACT OF ADVERTISING SPEND ACROSS DIFFERENT MEDIA CHANNELS ON MONTHLY SALES USING MULTIPLE LINEAR REGRESSION IN MINITAB.

1. Background & Objectives

A retail brand invested in multiple advertising channels but lacked clarity on which platforms drove the most revenue. This study used Minitab to perform a regression analysis to quantify the effect of digital, television, and print ad spend on monthly sales, helping inform future media buying strategies.

2. Methodology

Data Source:

A synthetic dataset with 24 months of data, including:

- **Dependent Variable:** Monthly Sales (USD)
- **Independent Variables:**
    - Digital Advertising Spend (USD)
    - Television Advertising Spend (USD)
    - Print Advertising Spend (USD)
    - Season (Dummy: 1 = High Season, 0 = Low Season)

Software Used:

Minitab 21

Steps Followed in Minitab:

1. **Data Preparation:**
    - Imported .csv file
    - Created dummy variable for high vs. low seasonal demand
2. **Exploratory Data Analysis:**
    - Scatterplot matrix generated to visualize relationships

    - Correlation matrix computed to check for multicollinearity

3. **Regression Modeling:**
    - *Stat > Regression > Fit Regression Model*
    - Stepwise regression applied to refine model
4. **Diagnostics & Validation:**
    - Checked VIF, residual plots, and leverage points
    - R-squared and adjusted R-squared used for model fit evaluation

3. Results & Interpretation

- **Significant Predictors ($p < 0.05$):**
    - Digital Ad Spend
    - Television Ad Spend
    - Season
- **Model Fit:**
    - $R^2 = 0.88$, Adjusted $R^2 = 0.85$
    - VIFs below 3 → no multicollinearity issues
    - Residuals roughly normal with no major patterns in residual plots
- **Key Insights:**
    - Digital ads had the highest ROI: every \$1,000 spent increased sales by ~\$6,200
    - Television ads were also effective, though less efficient than digital
    - Print ads showed no statistically significant effect on sales

4. Visual Outputs (Created in Minitab)

- Multiple Regression Summary Table
- Contribution Bar Chart (predictor importance)
- Actual vs. Predicted Sales Line Graph
- Histogram of Residuals

5. Recommendations

- Shift ad budget toward digital platforms
- Reduce or reassess investment in print media
- Double down on TV advertising during high sales seasons for reinforcement

6. Future Work

- Test lag effects of advertising on sales using time-series regression
- Include additional digital metrics like click-through rate or engagement
- Apply multivariate regression across product categories

7. Stakeholder Relevance

Academic Use:

- Demonstrates regression modeling in marketing contexts
- Useful for MBA projects or marketing analytics coursework

Corporate Use (Retail/Marketing Teams):

- Supports evidence-based marketing strategy
- Helps justify budget reallocations across advertising channels