**Ex No: 8 Implementation of Linear Regression**

**Problem Scenario**

A marketing company wants to understand how its advertising budget impacts product sales. For this study, they have collected data on the amount spent on **TV advertisements** and the corresponding **sales revenue** generated. The company suspects that sales are directly influenced by the TV advertising budget and wishes to quantify this relationship.

The dataset ([*Advertising Dataset*](https://raw.githubusercontent.com/selva86/datasets/master/Advertising.csv)) consists of two columns:

* **TV**: The advertising budget spent on TV (in thousands of dollars).
* **Sales**: The sales of the product (in thousands of units).

However, the company requires two types of analysis:

1. **Mathematical (User-defined) Least Squares Method**
   * Derive the regression line by manually calculating slope and intercept.
   * Use the regression equation to predict sales based on TV advertising spend.
   * Calculate and report the **R² value** to evaluate model performance.
   * Visualize the relationship with a scatter plot and regression line.
2. **Scikit-learn LinearRegression Model**
   * Fit the dataset using the LinearRegression class from scikit-learn.
   * Retrieve the model coefficient (slope), intercept, and R² score.
   * Compare these results with the mathematical approach to validate correctness.

The marketing head expects this analysis to help in forecasting sales and optimizing future advertising budgets.