**Ridge Regression**, and **Lasso Regression**

Analyze the CarPrice\_Assignment.csv dataset to build and compare the performance of **Multiple Regression**, **Ridge Regression**, and **Lasso Regression** models using Root Mean Squared Error (RMSE) as the evaluation metric.

**Questions**

1. **Data Loading and Exploration**  
   a. Load the CarPrice\_Assignment.csv dataset using pandas.  
   b. Display the first 5 rows of the dataset.  
   c. How many rows and columns are there in the dataset?  
   d. Display the data types of all columns. Which columns are categorical, and which are numerical?  
   e. Are there any missing values in the dataset? If yes, handle them appropriately.  
   f. Display the basic statistical details (mean, median, standard deviation, etc.) of all numerical columns.
2. **Feature Selection**  
   a. Select the following columns as **input features (independent variables)**:
   * enginesize
   * horsepower
   * carwidth
   * curbweight
   * highwaympg  
     b. Use the price column as the **target variable (dependent variable)**.
3. **Data Splitting**  
   a. Split the dataset into training and testing sets, ensuring 80% of the data is used for training and 20% for testing.  
   b. Display the shapes of the training and testing datasets.
4. **Model Implementation and Training**  
   a. **Multiple Regression**  
   i. Train a **Multiple Regression model** using the training data.  
   ii. Display the coefficients and intercept of the trained model.

b. **Ridge Regression**  
i. Train a **Ridge Regression model** with an alpha value of 1.0 using the training data.  
ii. Display the coefficients and intercept of the trained Ridge model.

c. **Lasso Regression**  
i. Train a **Lasso Regression model** with an alpha value of 1.0 using the training data.  
ii. Display the coefficients and intercept of the trained Lasso model.

1. **Model Evaluation**  
   a. Use all three models (**Multiple Regression**, **Ridge Regression**, and **Lasso Regression**) to make predictions on the test dataset.  
   b. Calculate and display the following performance metrics for each model:
   * **Root Mean Squared Error (RMSE)**
   * **R² Score**  
     c. Present the performance metrics for the three models in a comparison table.
2. **Comparison and Analysis**  
   a. Based on the RMSE and R² scores, which model performs the best?  
   b.  Experiment with different alpha values (e.g., 0.1, 5, 10) for Ridge and Lasso Regression. How do these changes affect the performance metrics (RMSE and R² Score)?

**c.** Visualize the **actual vs. predicted prices** for all three models using scatter plots.