

```

# Importing necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import Ridge, Lasso, ElasticNet
from sklearn.preprocessing import PolynomialFeatures, StandardScaler
from sklearn.pipeline import Pipeline
from sklearn.metrics import mean_squared_error, r2_score

# Load the dataset
data = pd.read_csv("/content/CarPrice_Assignment (2).csv")

# Data preprocessing
data = data.drop(['CarName', 'car_ID'], axis=1)
data = pd.get_dummies(data, drop_first=True)

# Splitting the data into features and target variable
X = data.drop('price', axis=1)
y = data['price']

# Standardizing the features and target
scaler_X = StandardScaler()
scaler_y = StandardScaler()
X = scaler_X.fit_transform(X)
y = scaler_y.fit_transform(y.values.reshape(-1, 1)).ravel()

# Splitting the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

# Define the models and pipelines
models = {
    "Ridge": Ridge(alpha=1.0),
    "Lasso": Lasso(alpha=1.0),
    "ElasticNet": ElasticNet(alpha=1.0, l1_ratio=0.5)
}

# Dictionary to store results
results = {}

# Train and evaluate each model
for name, model in models.items():
    # Create a pipeline with polynomial features and the model
    pipeline = Pipeline([
        ('poly', PolynomialFeatures(degree=2)),
        ('regressor', model)
    ])

```

```

# Fit the model
pipeline.fit(X_train, y_train)

# Make predictions
predictions = pipeline.predict(X_test)

# Calculate performance metrics
mse = mean_squared_error(y_test, predictions)
r2 = r2_score(y_test, predictions)

# Store results
results[name] = {'MSE': mse, 'R2 score': r2}

# Print results
for model_name, metrics in results.items():
    print(f"{model_name} - Mean Squared Error: {metrics['MSE']:.2f},  
R2 score: {metrics['R2 score']:.2f}")

# Visualization of the results
# Convert results to DataFrame for easier plotting
results_df = pd.DataFrame(results).T
results_df.reset_index(inplace=True)
results_df.rename(columns={'index': 'Model'}, inplace=True)

# Set the figure size
plt.figure(figsize=(12, 5))

# Bar plot for MSE
plt.subplot(1, 2, 1)
sns.barplot(x='Model', y='MSE', hue='Model', data=results_df,
palette='viridis', legend=False)
plt.title('Mean Squared Error (MSE)')
plt.ylabel('MSE')
plt.xticks(rotation=45)

# Bar plot for R2 score
plt.subplot(1, 2, 2)
sns.barplot(x='Model', y='R2 score', hue='Model', data=results_df,
palette='viridis', legend=False)
plt.title('R2 Score')
plt.ylabel('R2 Score')
plt.xticks(rotation=45)

# Show the plots
plt.tight_layout()
plt.show()

```

Ridge - Mean Squared Error: 0.23,  $R^2$  score: 0.81  
Lasso - Mean Squared Error: 1.05,  $R^2$  score: 0.15  
ElasticNet - Mean Squared Error: 0.65,  $R^2$  score: 0.47

