ML LAB 4

Link to dataset-: https://www.kaggle.com/datasets/yasserh/housing-prices-dataset

(same dataset as previous lab)

Q1: Use the above given dataset, fit the Linear regression model using the function of Sklearn library. Check for all 5 assumptions of the linear regression.

Q2: Use the above given dataset, do the VIF analysis and fix the multicollinearity issue if exist.

Q3. Ridge Regression – Scratch Implementation

a) Load the dataset and use all numerical features (area, bedrooms, bathrooms, stories, parking) to predict price.
b) Implement **Ridge Regression from scratch** using:

- Normal Equation (OLS) with L2 penalty
- Gradient Descent with L2 penalty

c) Evaluate the model using **MSE and R^2**.

Q4. Hyperparameter Tuning with GridSearch

a) Use GridSearchCV to tune **alpha** for Ridge over the range {0.01, 0.1, 1, 10, 100}.
b) Report the best alpha chosen by GridSearch.
c) Evaluate the final models on test data (MSE and R^2).