

Dataset 1: Simple Linear Regression

My Model:

Predicted Parameters:

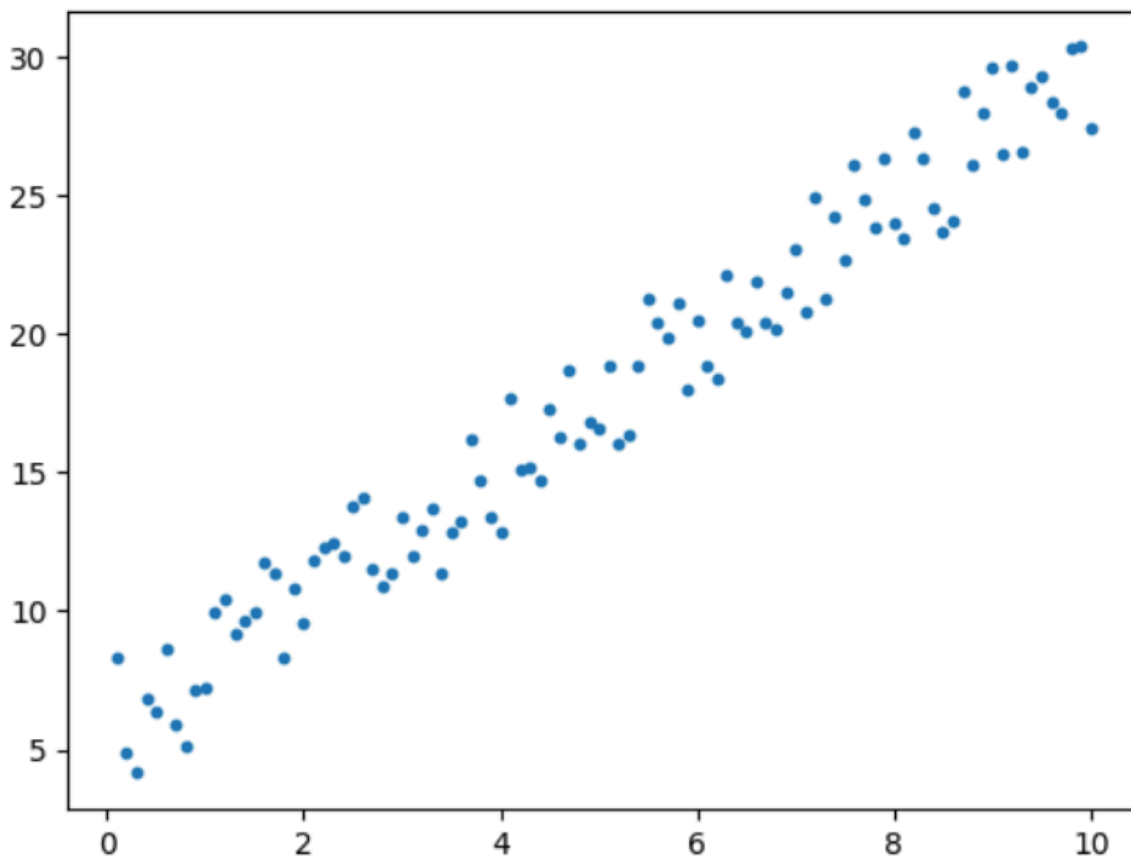
[5.681, 2.384]

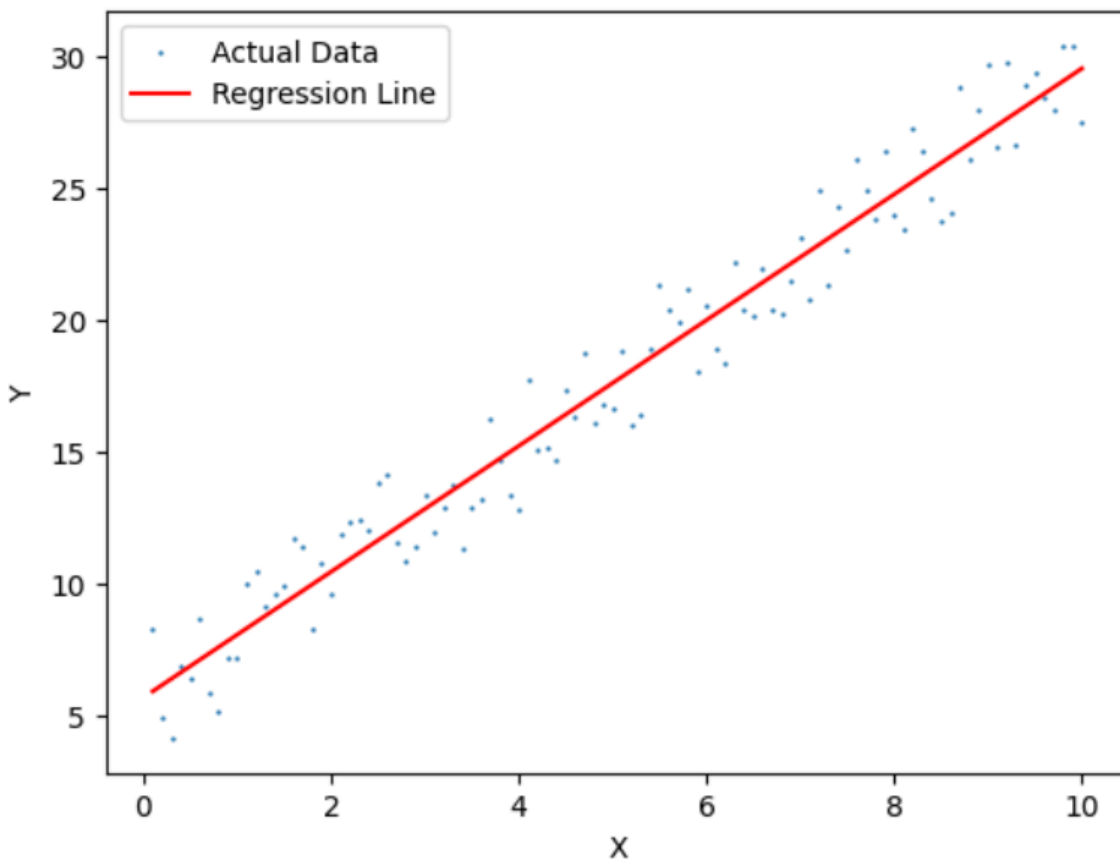
Predicted Values:

[5.680787126761226, 2.384060066057183]

Errors:

[MAE: 1.2806, MSE: 2.0785, RMSE: 1.4417, R_square: 0.958]





Scikit-learn Model:

Predicted Values:

[5.68078713, 2.38406007]

Errors:

[MAE: 1.2806, MSE: 2.0785, RMSE: 1.4417, R_square: 0.958]

Dataset 2: Linear Regression with Non-linear Transformation

My Model:

Predicted Parameters:

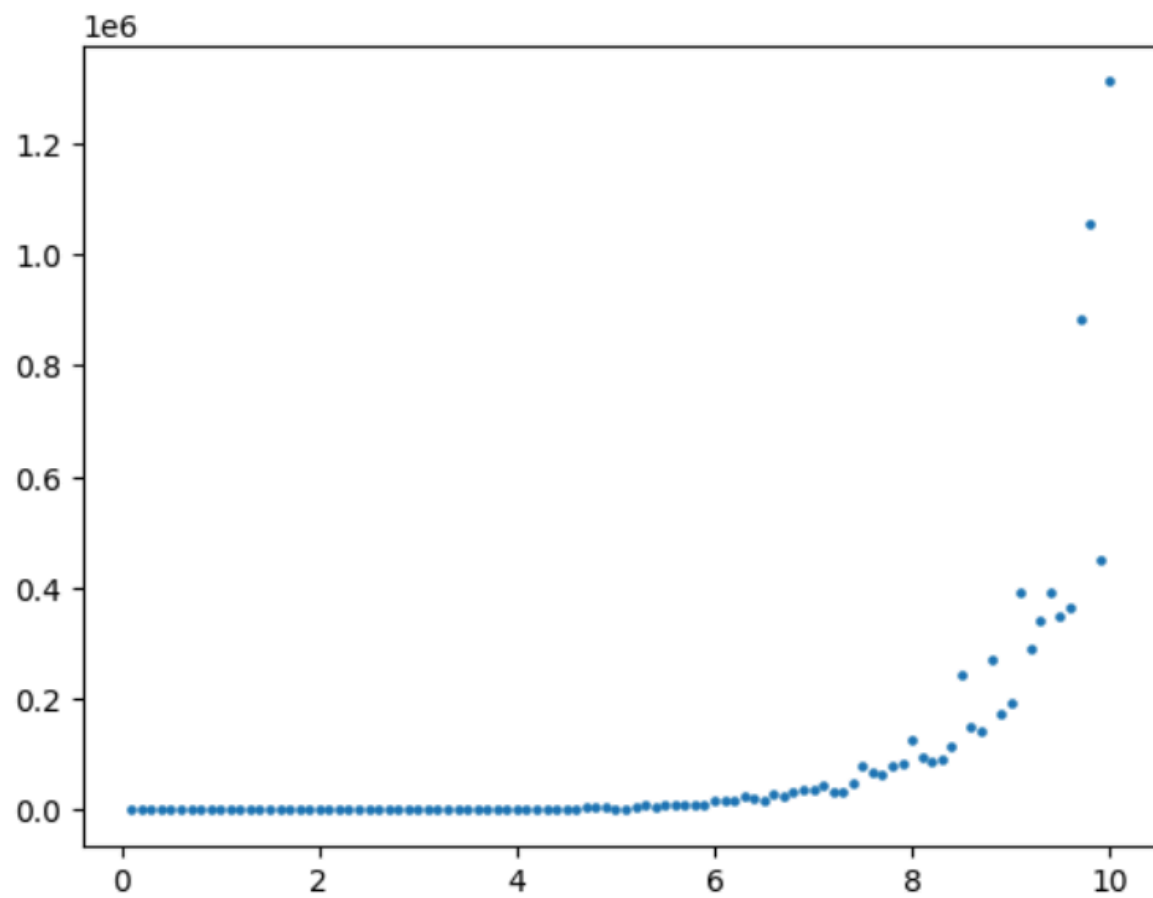
[39.7306395177676, 0.9729974518460589]

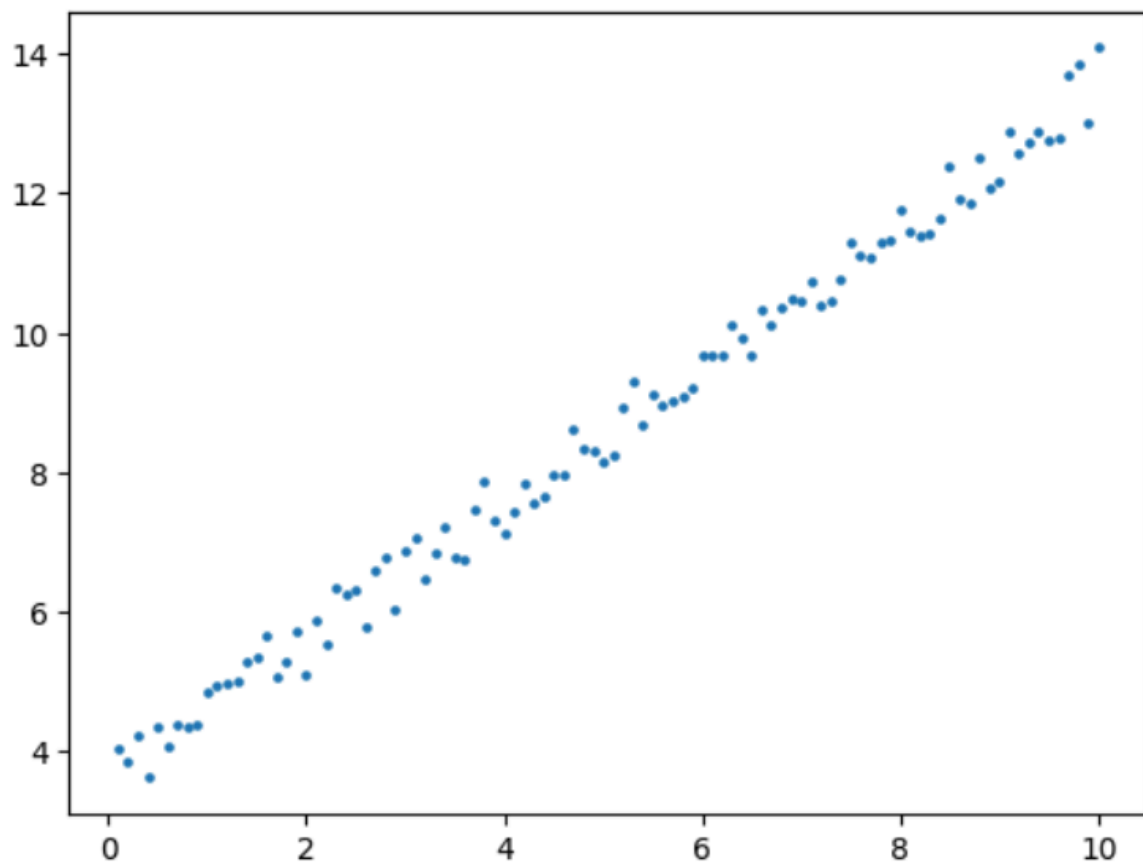
Predicted Values:

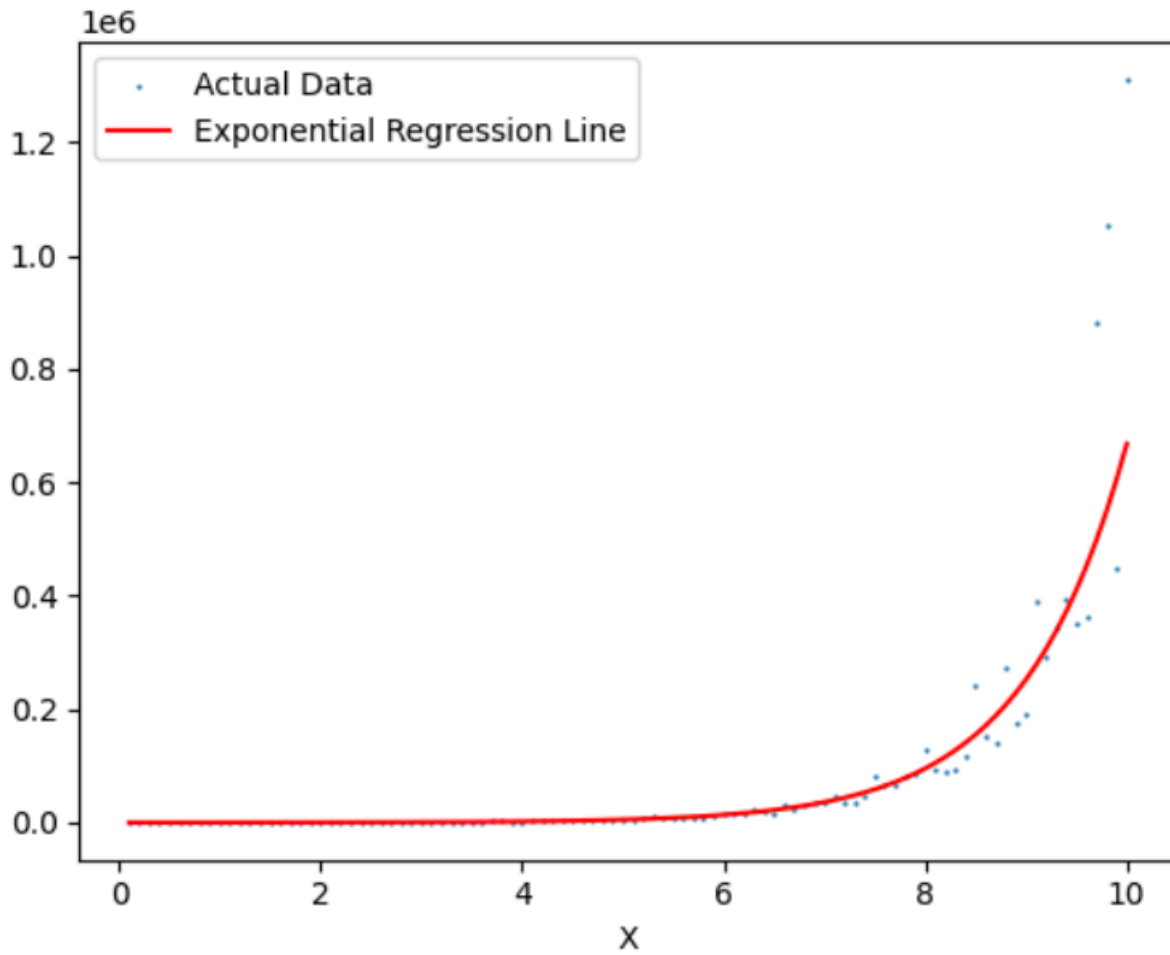
[39.7306395177676, 0.9729974518460589]

Errors:

[MAE: 0.235, MSE: 0.0764, RMSE: 0.2765, R_square: 0.990]







Scikit-learn Model:

Predicted Values:

[39.73063952, 0.97299745]

Errors:

[MAE: 0.235, MSE: 0.0764, RMSE: 0.2765, R_square: 0.990]

Dataset 3: Linear Regression and Non-linear Transformation (Exponential)

Linear Regression:

Predicted Parameters:

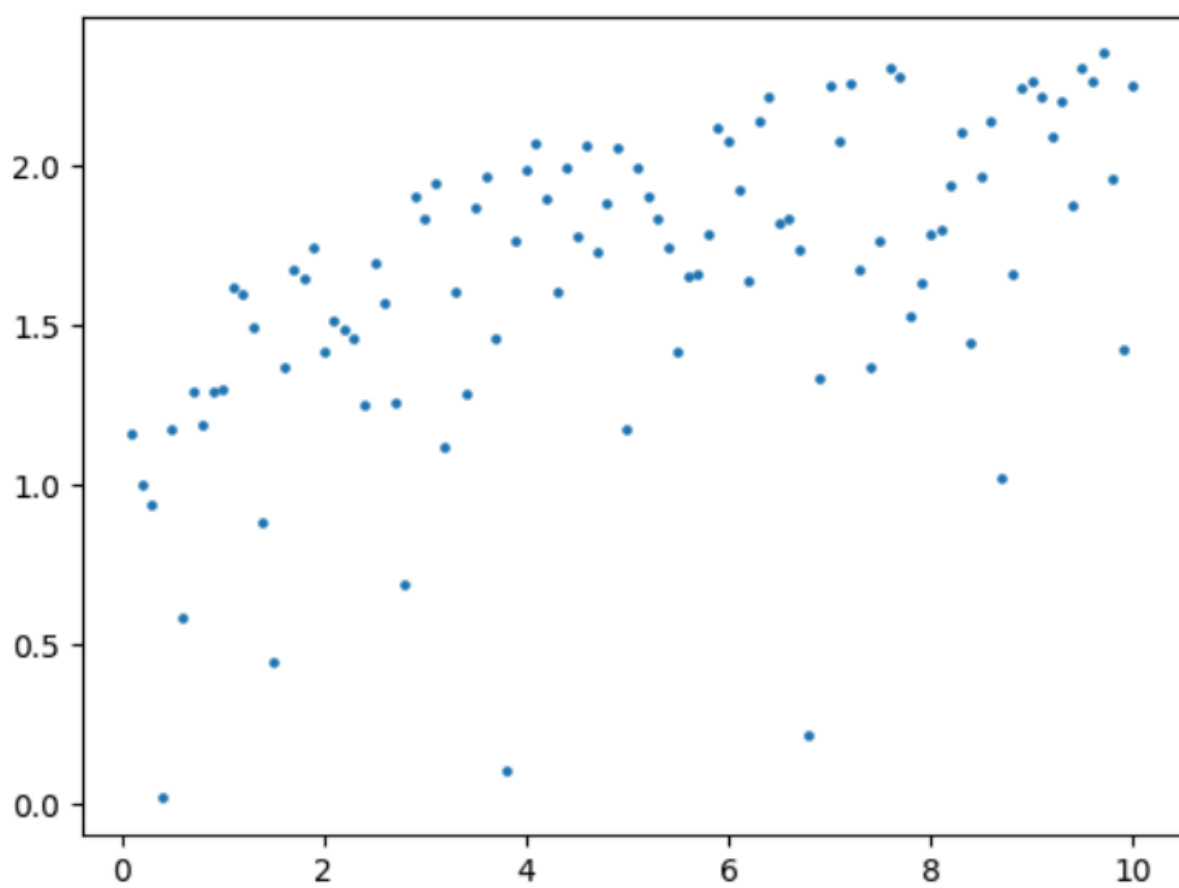
[1.1770620783119932, 0.09419021414817955]

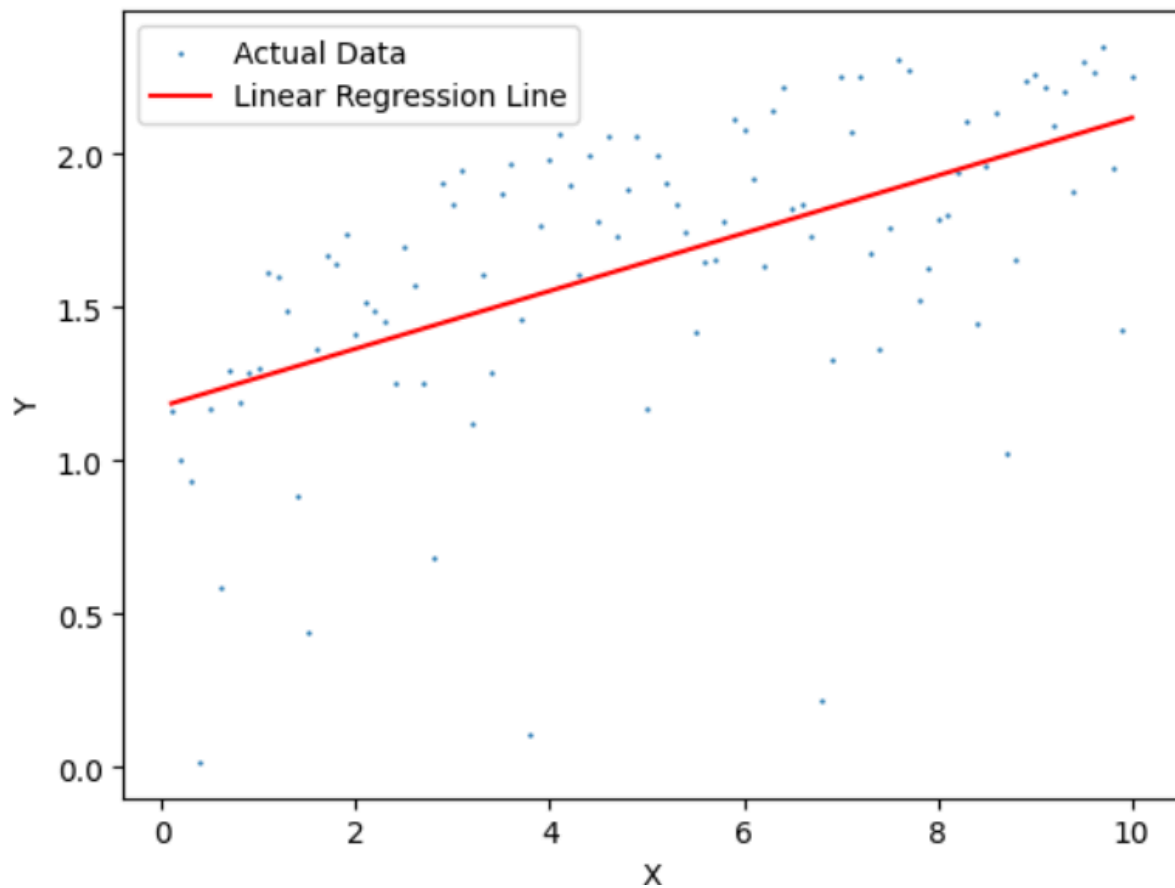
Predicted Values:

[1.1770620783119932, 0.09419021414817955]

Errors:

[MAE: 0.2947, MSE: 0.1617, RMSE: 0.4022, R_square: 0.3137]





Exponential Transformation:

Errors:

[MAE: 1.2632, MSE: 1.7324, RMSE: 1.3162, R_square: -6.3514]

Dataset 4: Multiple Linear Regression

My Model:

Predicted Parameters:

[13.239477941118366, 6.132437615313393, 2.392265549258809, 7.746810380660236]

Predicted Values:

[13.239477941118366, 6.132437615313393, 2.392265549258809, 7.746810380660236]

Errors:

[MAE: 5.1555, MSE: 34.6205, RMSE: 5.8839, R_square: 0.984]

Scikit-learn Model:

Predicted Values:

[13.239477824445359, 6.13243763, 2.39226554, 7.74681038]

Errors:

[MAE: 5.1555, MSE: 34.6205, RMSE: 5.8839, R_square: 0.984]

Gradient Descent vs. Stochastic Gradient Descent on Data4.csv

My Model:

Predicted Parameters:

[13.239477941118366, 6.132437615313393, 2.392265549258809, 7.746810380660236]

Gradient Descent (GD):

Predicted Values:

[13.18578203958556, 6.060680905255514, 2.445134785871812,
7.766764500756425]

Errors:

[MAE: 5.1550, MSE: 34.6208, RMSE: 5.8839, R_square: 0.984]

Stochastic Gradient Descent (SGD):

Predicted Values:

[13.154571488555078, 6.091250059460483, 2.3134524409841464,
7.827527898786717]

Errors:

[MAE: 5.1199, MSE: 34.6805, RMSE: 5.8890, R_square: 0.984]

Conclusion: Overall, the models perform well in most cases. However, careful consideration is needed, especially in Dataset 3, where linear regression alone and even after a non-linear transformation did not fit the data well.