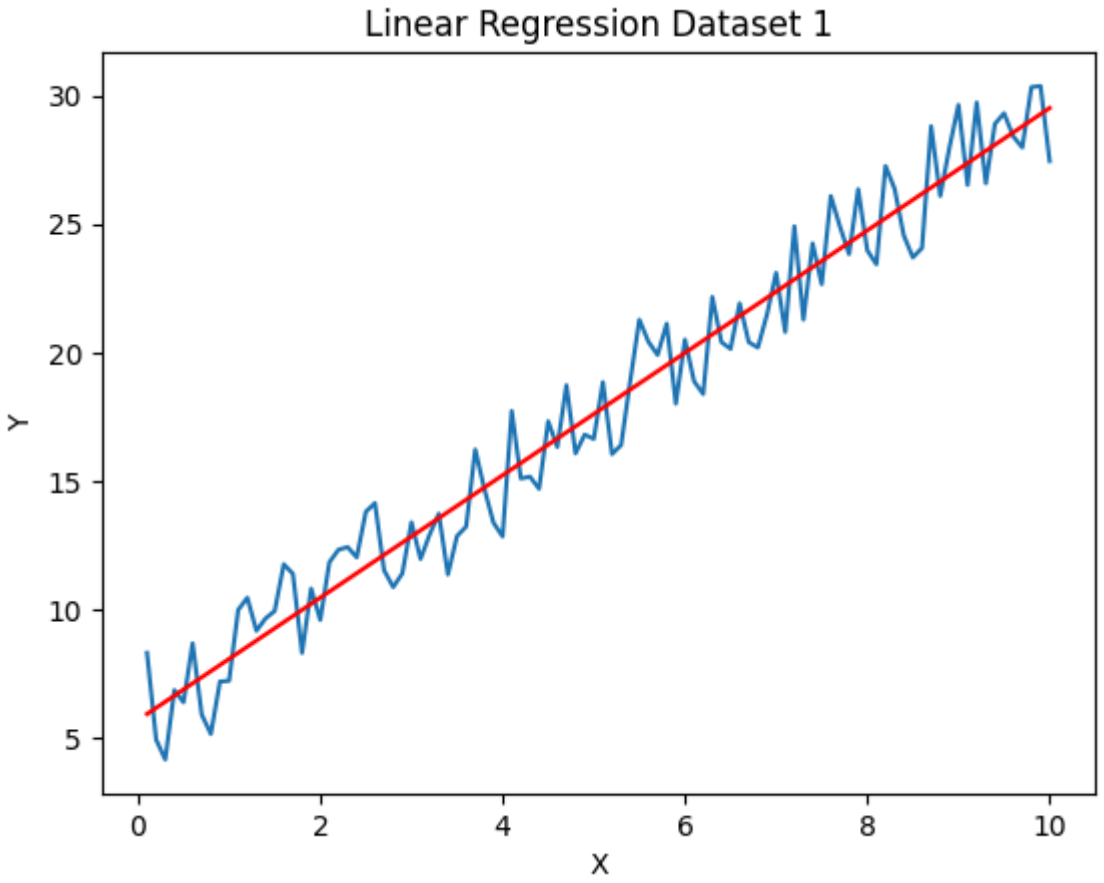
REPORT

DataSet - 1 (Linear Relationship Dataset)

HYPERPLANE = Straight Line

Conclusion	Mean Square Error	Root Mean Square Error	Absolute Mean Error	R Square
My Model	2.078525401773265	1.441709194594154 7	1.280555978429146	0.957957190558635 8
Scikit-Learn	2.078525401773274	1.441709194594155 1	1.280555978429147	0.957957190558635 7
Gradient Descent	2.078940681495592 6	1.441853210800459	1.280716088396416 2	0.957948790600643 9



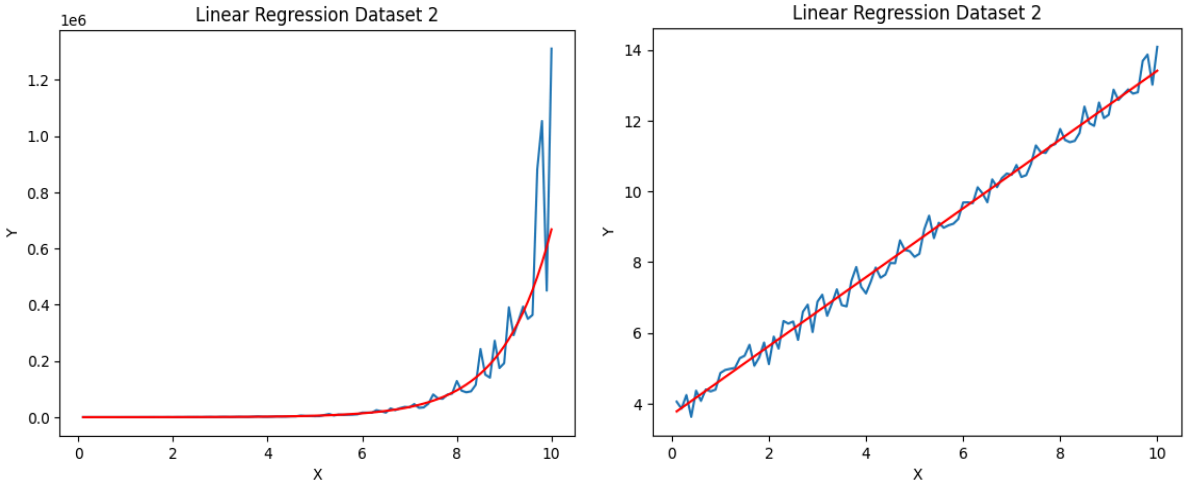
The Dataset 1 has shown that here we can simply apply our linear regression model. I have created my model, through this Python code I have implemented Linear Regression for one-dimensional output using Matrix Inverse and I have also checked through Scikit-learn model, mymodel is working fine and giving appropriate R^2

value through which I can say that linear relationship is existing between x and y. I have also applied Gradient Descent through which I had got the value of R^2 which also telling its linear relationship and R^2 value is less as compare to my predicted value by model.

DATASET - 2 (Non-Linear Relationship Dataset)

HYPERPLANE = Exponential

Conclusion	Mean Square Error	Root Mean Square Error	Absolute Mean Error	R Square
My Model	0.07643342704351962	0.27646596000086774	0.23498835289025688	0.9904038522690993
Scikit-Learn	0.07643342704351971	0.27646596000867757	0.23498835289025732	0.9904038522690993
Gradient Descent	0.07661059806137713	0.27678619557758942	0.23614396912221068	0.9903816086078275



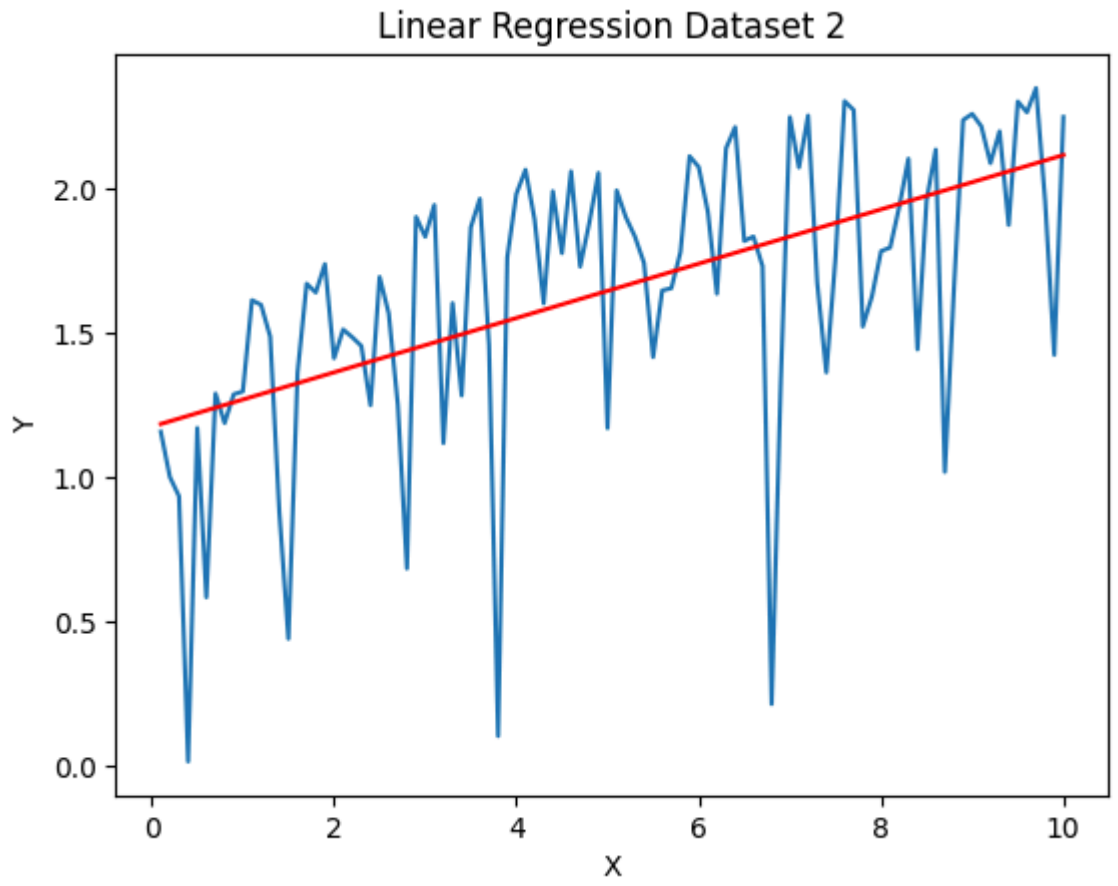
When I plotted this dataset, it appears that its exponential, so its confirmed that i have to do some linear transformation of this non-linear relationship dataset so that I can apply linear regression on it. After doing linear transformation, by taking logarithmic transformation of output “y”, so that my linear regression model gets fit in this.After this my model predicted value of R^2 value very close to 1, which ultimately

shows that it have linear relationship.
Gradient Descent also shown the almost same scenario here
.

DATASET 3 (Scattered Dataset)

HYPERPLANE = No such hyperplane

Conclusion	Mean Square Error	Root Mean Square Error	Absolute Mean Error	R Square
My Model	0.16173044143088552	0.40215723471160 57	0.29467793301310363	0.31369732267280 79
Scikit-Learn	0.16173044143088552	0.40215723471160 57	0.29467793301310 38	0.31369732267280 79



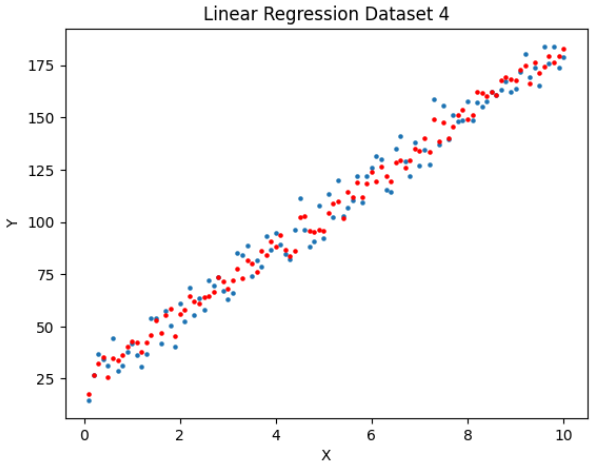
This dataset was showing no such relationship which can we predicted through linear regression model, I have applied this on my model, but R^2 value came very much less than

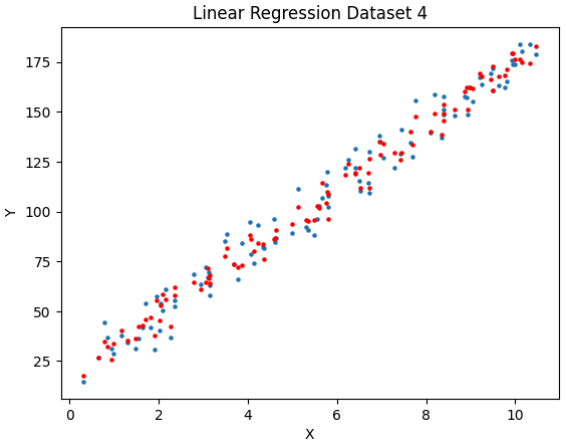
1, so it was confirmed that we can’t apply linear regression here. Dataset points are showing many outlier points and Scikit model also giving R^2 value very much less.

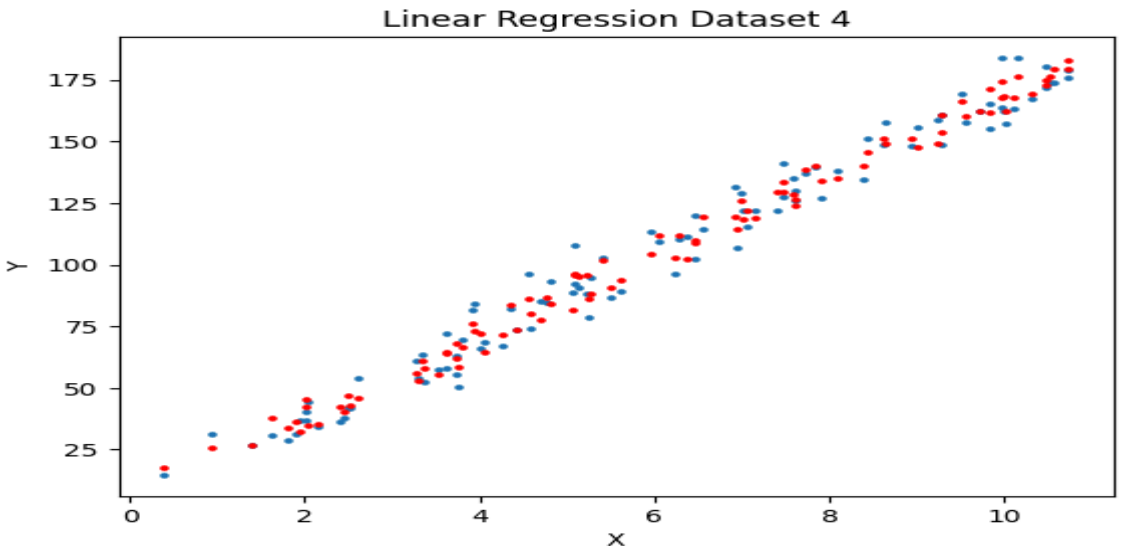
DATASET 4 (Multivariable linear regression)

HYPERPLANE = 2-D PLANE

Conclusion	Mean Square Error	Root Mean Square Error	Absolute Mean Error	R Square
My Model	34.62048082924355	5.883917133104744	5.155505630377769	0.9841749058943147
Scikit-Learn	34.62048082924356	5.883917133104745	5.155505630378745	0.9841749058943147
Gradient Descent	34.62048082924355	5.883917133104744	5.155505630377769	0.9841749058943147







This dataset was for the multivariable linear regression model, I have created my model using numpy library and when I applied this dataset over that, I came to know the relationship is linear in multi-variable form. R^2 value is coming very close to 1, which is showing that it have linear relation between the output variable.Scikit-learn also has shown almost the same value of R^2 as mine.

Conclusion:

I have come to the conclusion that Dataset 3 is not applicable in linear regression model. Dataset 2 has shown some non-linear relationship, so we have to do some logarithmic transformation ro make it fit in linear regression model. Dataset 1 and Dataset 4 has linear relationship.