Mubeen Quadrt
Student ID: 80106431
Homework 0
ECGR 4105

Homework 0 Report

Github Repository:

https://github.com/MubeenQ/IntroMLHW/blob/main/MubeenQuadrtHomework0ECGR4105.ipynb

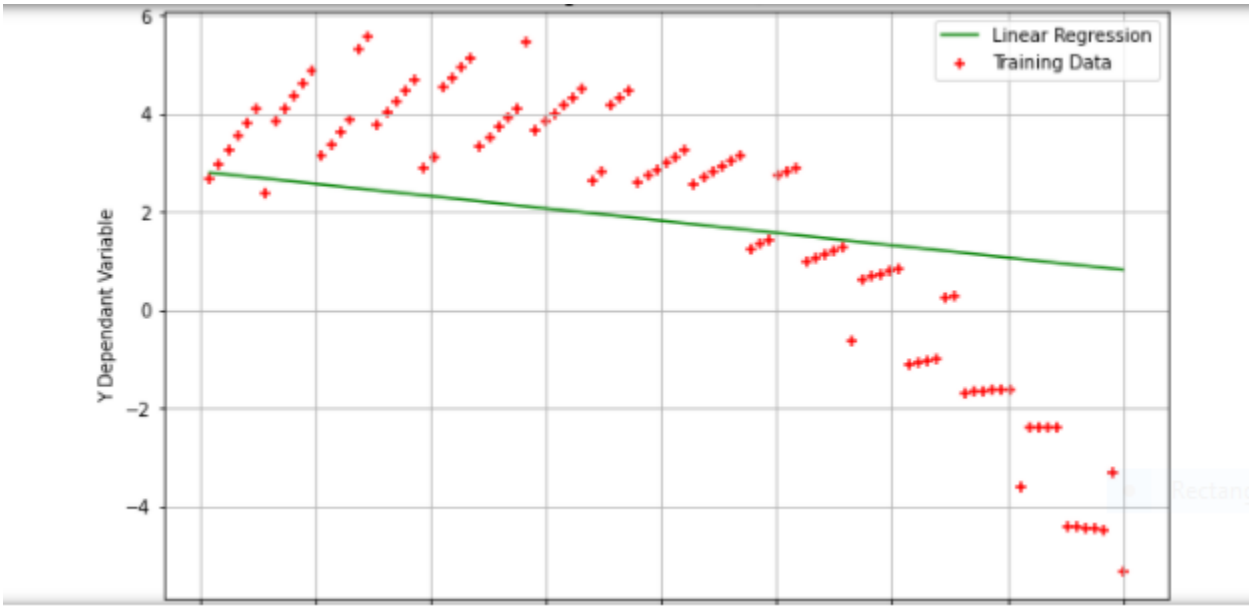
Problem 1:

1. Report the linear model you found for each explanatory variable.

The linear model for the X1 explanatory variable showed a slight descent about halfway through the data. The linear model for the X2 explanatory variable was much more scattered and showed a slight increased as the data progressed. The X3 explanatory variable was also very scattered and showed a slight decrease throughout.

2. Plot the final regression model and loss over the iteration per each explanatory variable.

X1 Explanatory Variable:



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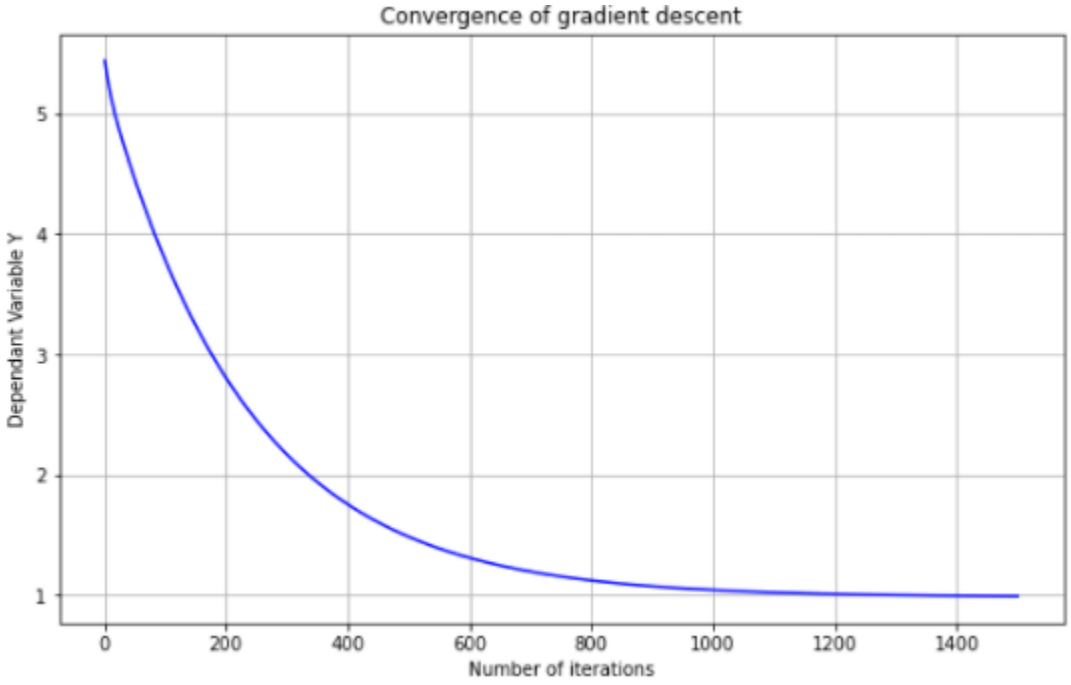
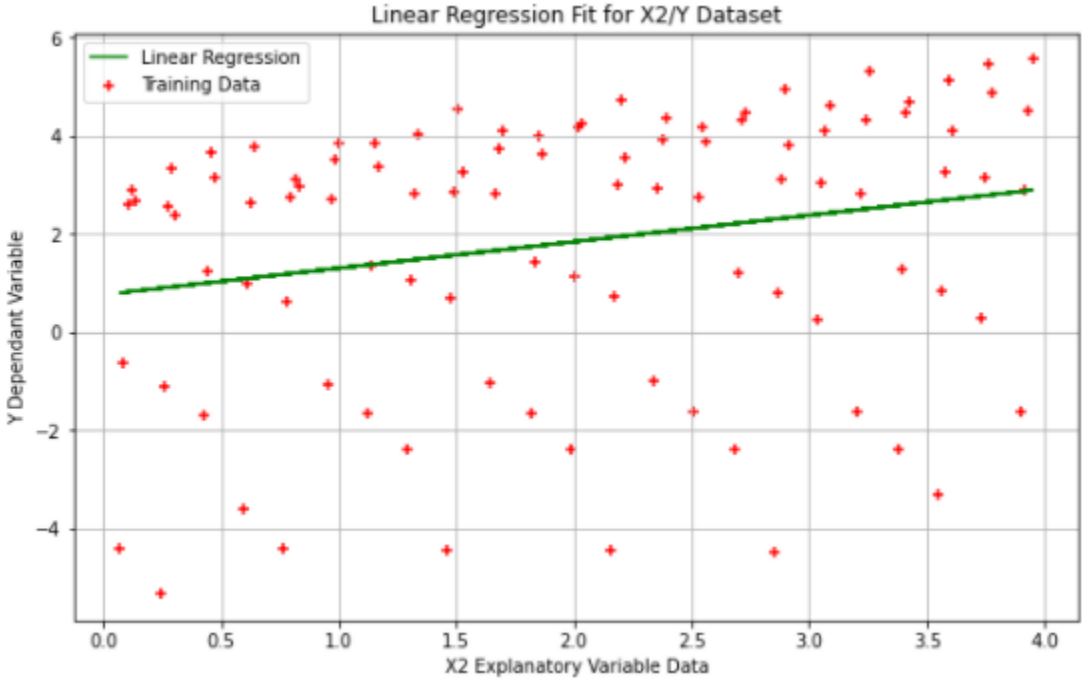


X2 Explanatory Variable:



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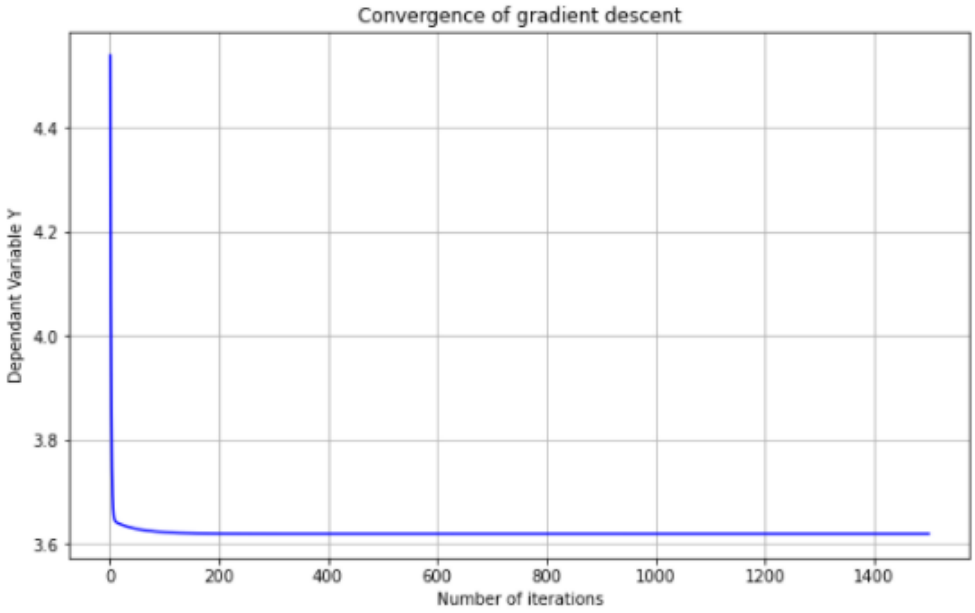
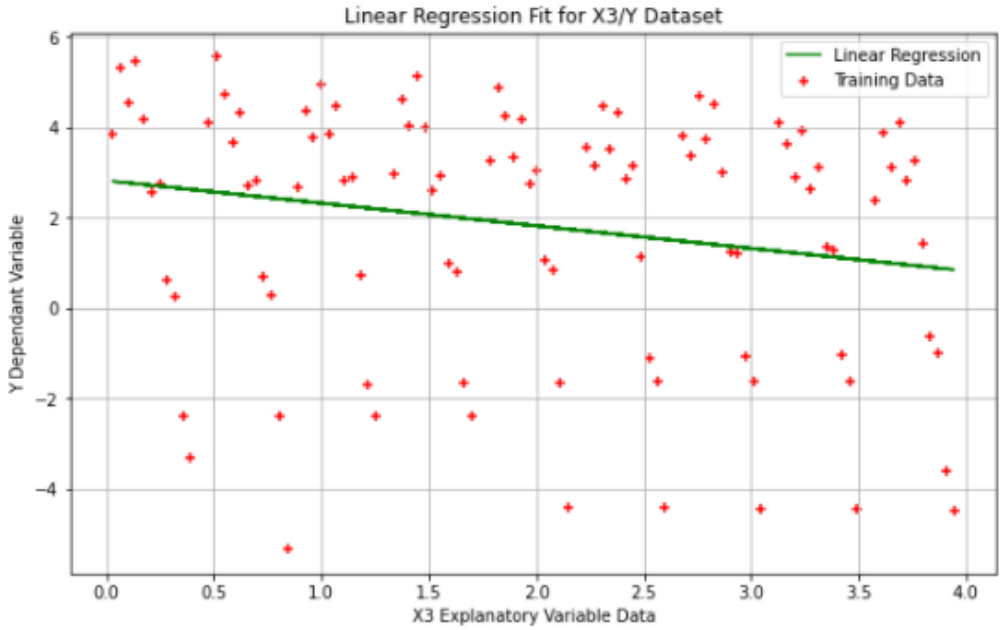


X3 Explanatory Variable:



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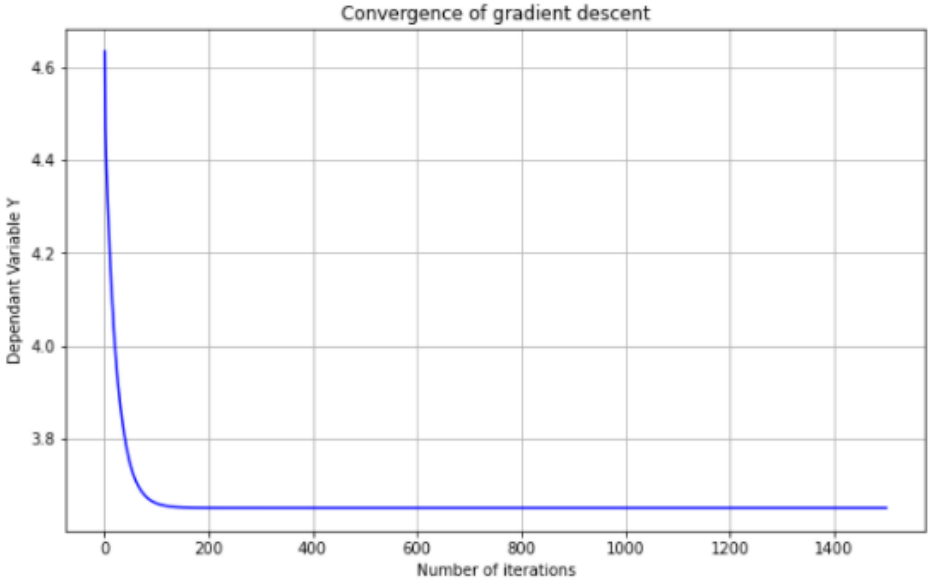

3. Which explanatory variable has the lower loss (cost) for explaining the output (Y)?

The X2 Explanatory Variable I would say, based off looking at the relationship of the iterations and output values in the gradient descent graph.

4. Based on your training observations, describe the impact of the different learning rates on the final loss and number of training iteration.

Based off viewing these different training observations, the varying learning rates will have a significant impact on final loss and number of training iteration. This is apparent when looking at the gradient descent graphs and how X1 (learning rate of 0.01) has a much more gradual decline when the number of iterations increase as opposed to X2 (learning rate of (0.05) and X3 (0.1).

Problem 2:

1. Report the final linear model you found the best.

The final linear model I found the best based on the data was with the X2 explanatory variable which had a learning rate of 0.05.

3. Based on your training observations, describe the impact of the different learning rates on the final loss and number of training iteration.

There is an inverse relationship, in that as learning rates increase the number of training iteration decreases.