

Problem 1: Model Selection

Part 2

For different value of Lambda Training and Validation MSE is shown below:

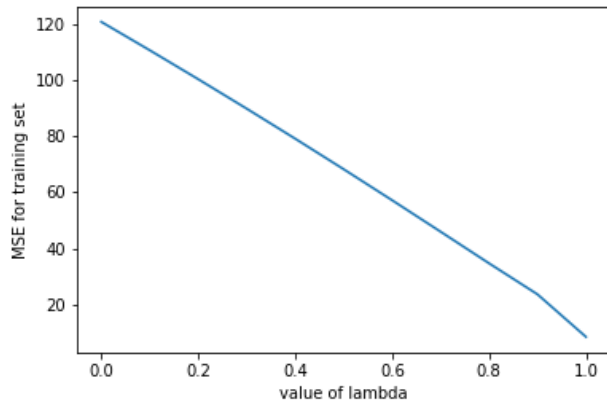


Fig: MSE of training Data for different Lambda

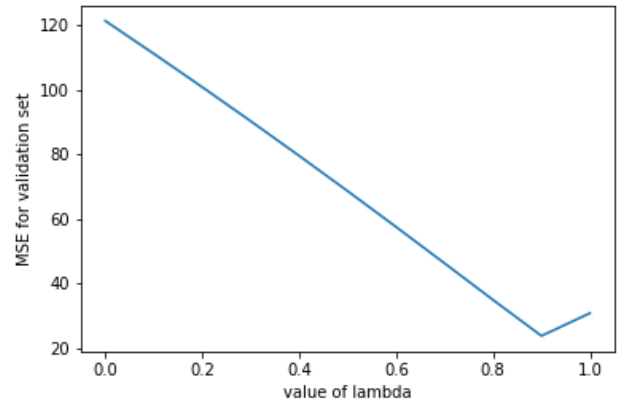


Fig: MSE of training Data for different Lambda

for $\lambda = 0.9$ we get validation error of 23.88 and training error 23.59. We can see for training data $\lambda = 1$ would give the least MSE but it might be overfitting the data as we seem to get a increased MSE in validation set.

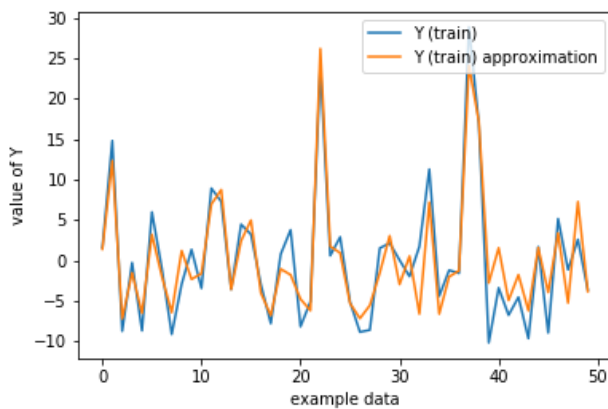


Fig: Visualize Fit of training data for lambda = 0.9

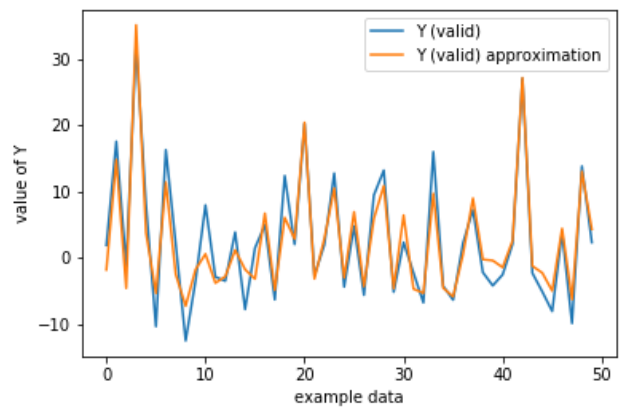


Fig: Visualize Fit of validation data for lambda = 0.9

In both training and validation set, the model seems to fit pretty accurately.

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Part 3

the for high lambda ($\lambda=0.9$) we best fit, which basically means penalizing the higher order terms in W and essentially making the higher degree on polynomial of X to zero. Thus, the degree of the source can be assumed to be two or three.