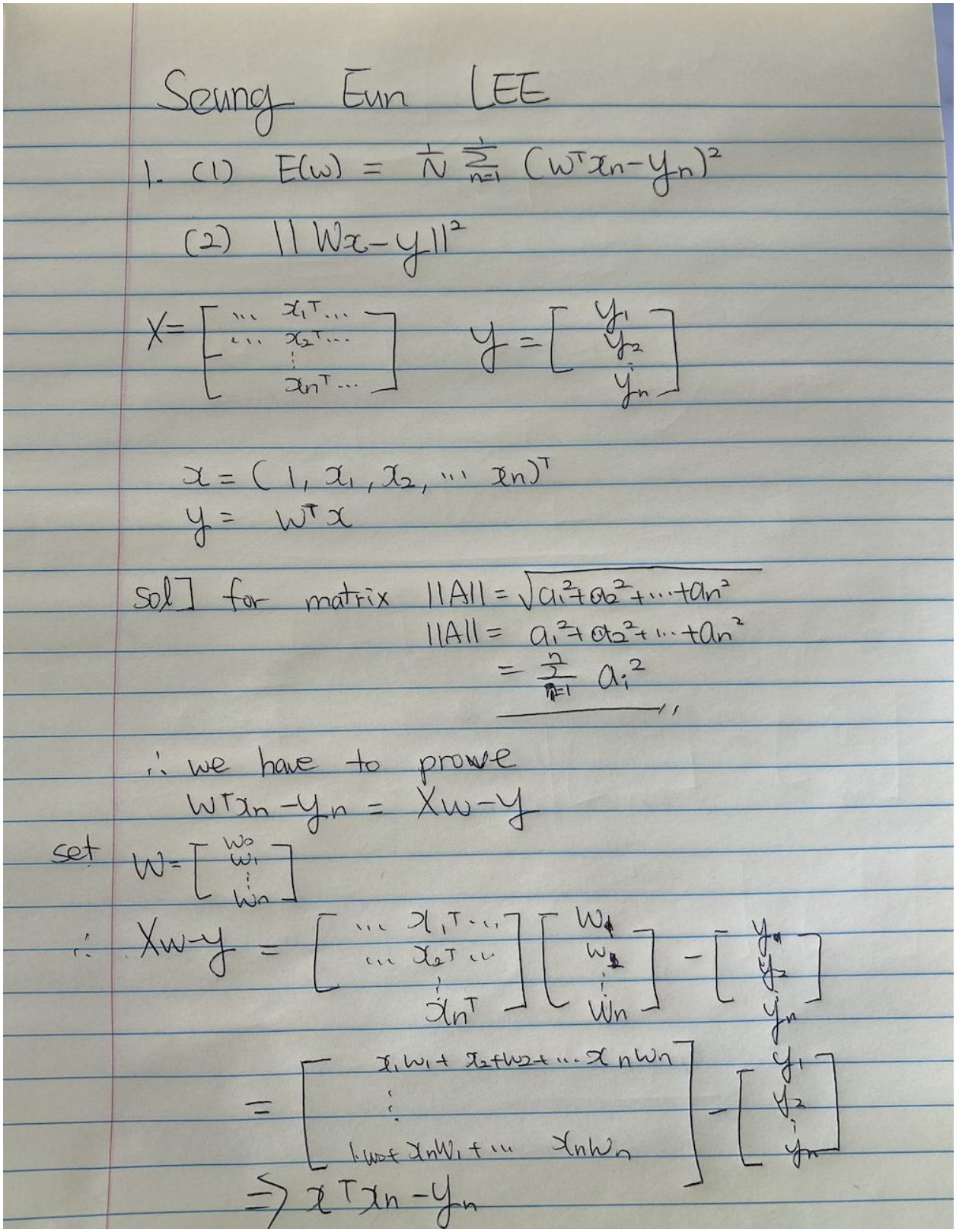
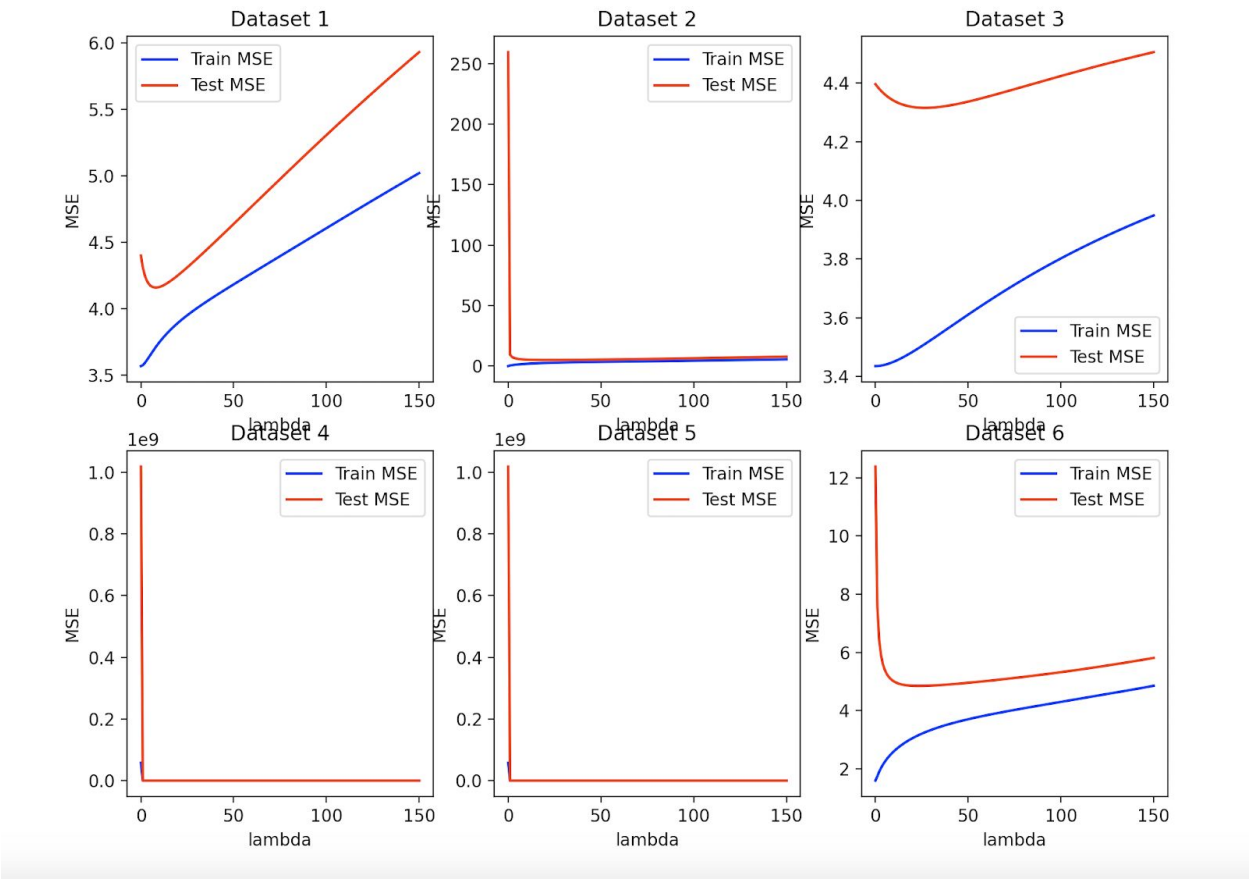
HW1 SEUNG EUN LEE

1.



2.



(a)

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2(a) Answer
for dataset 1 : lambda = 8 ,the least MSE = 4.159678509482883
for dataset 2 : lambda = 22 ,the least MSE = 5.078299800742583
for dataset 3 : lambda = 27 ,the least MSE = 4.315570630282889
for dataset 4 : lambda = 8 ,the least MSE = 5.540902229344971
for dataset 5 : lambda = 19 ,the least MSE = 5.2059119576778885
for dataset 6 : lambda = 23 ,the least MSE = 4.848943053166607
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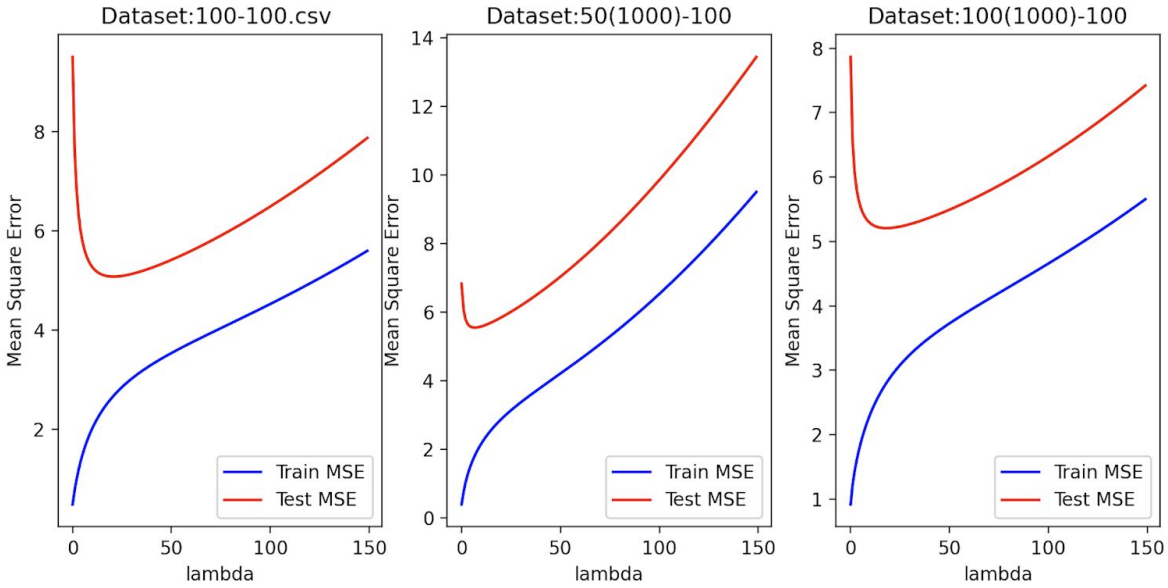
(b)



(c)

When the value of is 0,the penalty part no longer impacts the value of the cost function and thus the cost function is reduced back to the sum of squared errors. Therefore, it cause the over-fitting in the model.

3.

(a)

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3(a) Answer
for dataset 1 : lambda = 12 ,the least MSE = 4.158701799958345
for dataset 2 : lambda = 17 ,the least MSE = 8.67075152628309
for dataset 3 : lambda = 19 ,the least MSE = 12.840089668793643
for dataset 4 : lambda = 22 ,the least MSE = 18.149532364746882
for dataset 5 : lambda = 24 ,the least MSE = 23.012441635630744
for dataset 6 : lambda = 26 ,the least MSE = 27.975155952692894
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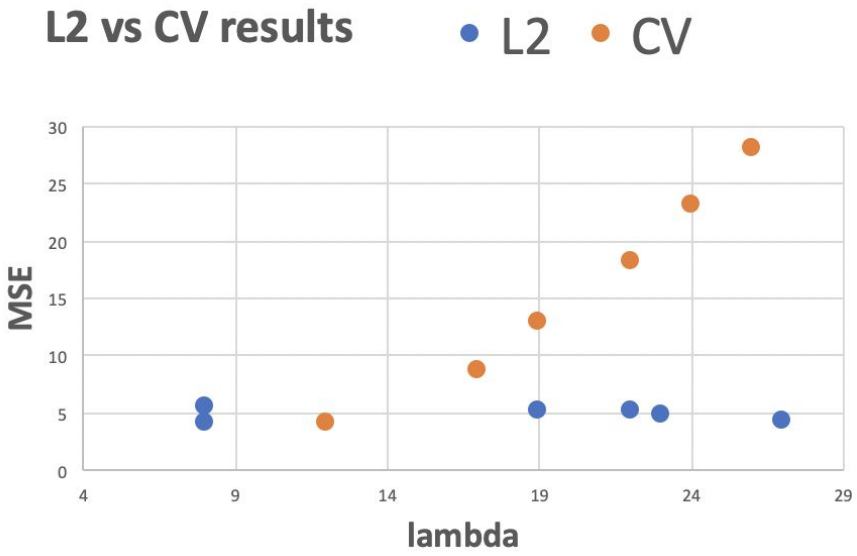
(b)



As you can see from the graph, results of CV were higher when lambda increases.

(c) Drawbacks of CV:

- It takes much time since there are many iteration training and evaluation
- The model might be only performing well to the given dataset and , since it use fixed test set
- High bias
- Overlapped training and test data between each round; Underestimated performance variance or overestimated degree of freedom for comparison

(d) Factors affecting the performance:

- the training set
- the test set
- Appropriate value of K

The training set affects the measurement indirectly through the learning algorithm, whereas the composition of the test set has a direct impact on the performance measure.