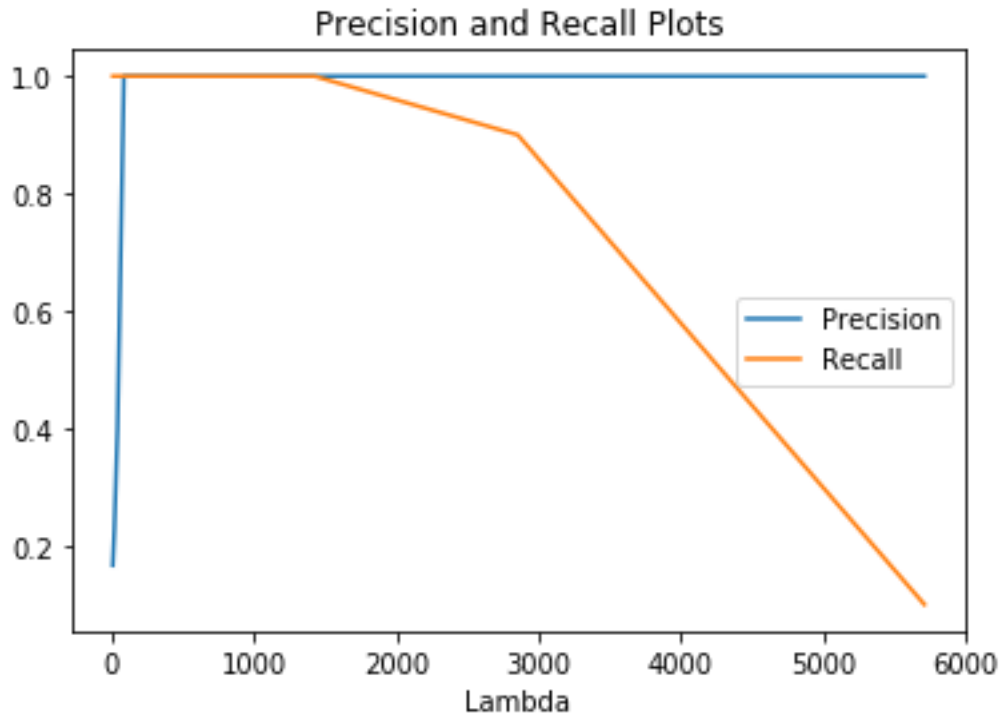
Q.4.3

1.

Starting from lambda max and finding precision recall for 10 iterartions, the following plot was made:

```
Precision [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 0.4, 0.22727272727272727,
0.16666666666666666]
Recall [0.1, 0.9, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]
```




2.

Changing sigma to 10:

Lambda value of 713.78 was used

This gave the following result:

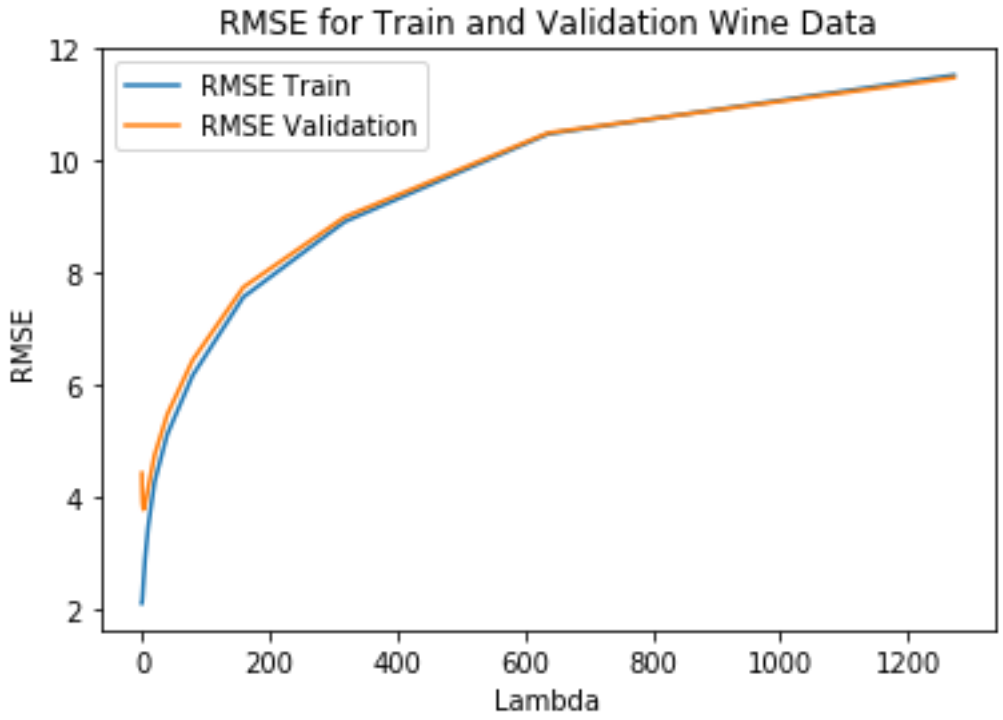
```
('Non zeros :', 10)
('Precision is : ', 0.15873015873015872)
('Recall is: ', 1.0)
```

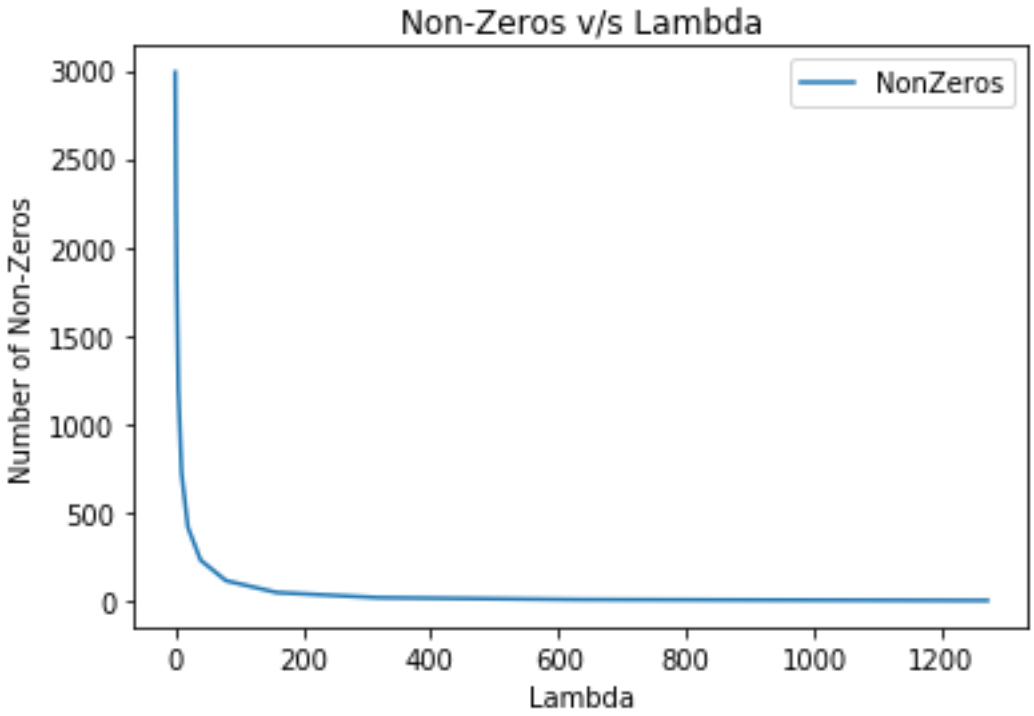
Precision was less but recall remained same.

*Please refer the last page of handwritten notes for the explanations of 4.3*

4.4

1.


RMSE for Train and Validation Wine Data
RMSE Train
RMSE Validation
RMSE
Lambda
12
10
8
6
4
2
0
200
400
600
800
1000
1200


Non-Zeros v/s Lambda
NonZeros
Number of Non-Zeros
Lambda
3000
2500
2000
1500
1000
500
0
0
200
400
600
800
1000
1200

2.

As seen from the RMSE plot,

RMSE on validation decreases till 3.79 after which it increases. The value of **lambda chosen = 2.48**

This achieves the best validation performance

Features with largest weights:

```
['spearmint\n',
 'stars\n',
 'big\n',
 'lifesaver\n',
 'ageability\n',
 'lemony\n',
 'sweet black\n',
 'nearly\n',
 'truly\n',
 'acidity provides\n']

Features with the smallest weights:

['earns\n',
 'high\n',
 'cherry berry\n',
 'soft\n',
 'sparkler\n',
 'liqueur\n',
 'cuts\n',
 'semillon\n',
 'banana\n',
 'brightened\n']
```

Words like “Lifesaver” and “big” contribute more the score and have higher weights than words like “soft” and “banana” which possibly people don’t like in wines. The weights therefore make some sense intuitively

3.

**RMSE on Test Data from Kaggle : 2.02698**