Assignment 1

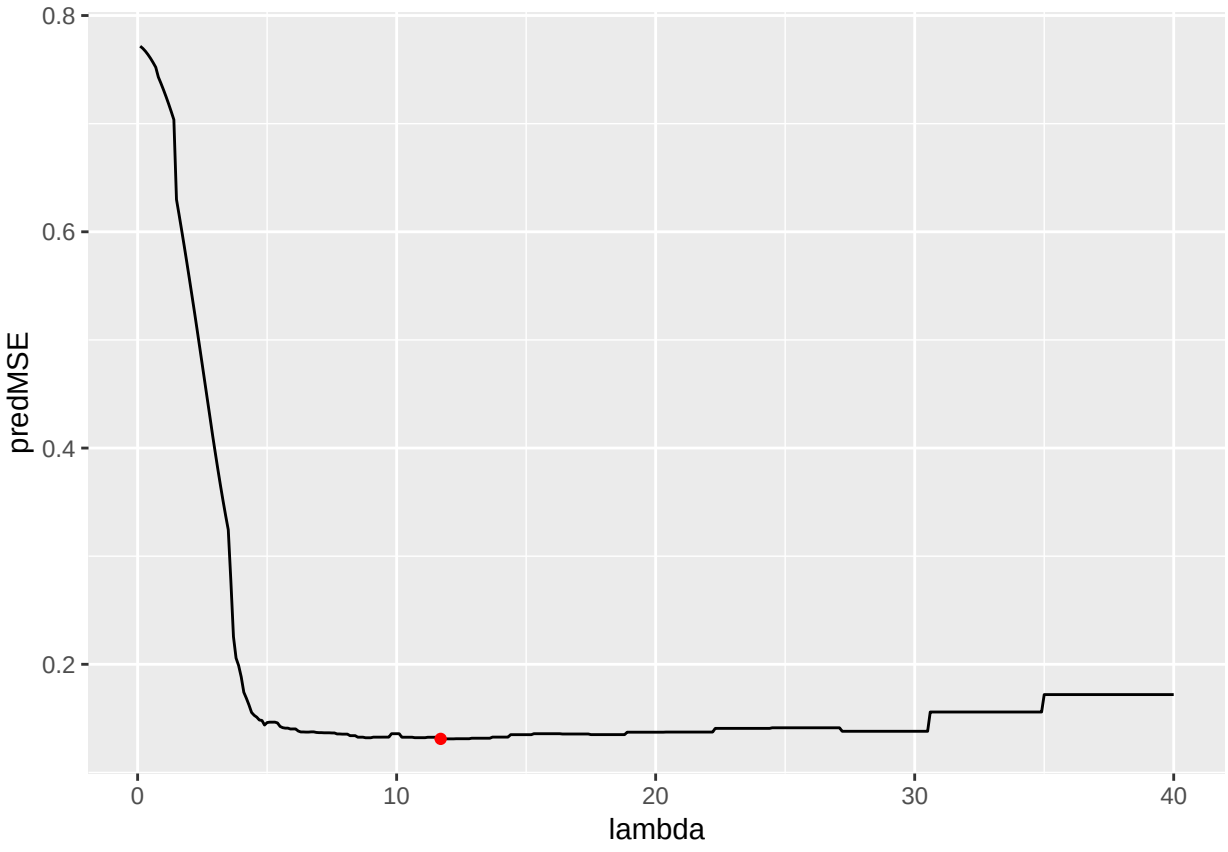
1. Reading Data

```
  Day   Rate       LMR
1   1 0.0014 -6.571283
2   2 0.0040 -5.521461
3   3 0.0051 -5.278515
4   4 0.0064 -5.051457
5   5 0.0075 -4.892852
6   6 0.0098 -4.625373
```

Reading Data into variable mortRate and adding log of the rate column to the data frame.

2. Created My_MSE function

3. Using the Function Created for different values of lambda.




```
The minimun value of MSE found by the irerative method is :  0.131046964831872
The corresponding value of lambda at which this minimum was found is :  11.7
```

The minimum found by the iterative method is shown on the plot with a red point.

4. Using the Optimize function to find minimum

```
Number of function calls taken for the optimize function to  find minimum :  27
```

```
The minimum found by the optimize function :
```

```
MIN MSE :  10.6881445713973
LAMBDA  :  0.132144141920378
```

We use the global variable iterForMyMSE to keep count of the number of times the function has been called.

5. Using Optimize with threshold on Accuracy : 0.01

```
Number of function calls taken for the optimize function to  find minimum :  18

The minimum found by the optimize function :

MIN MSE :  10.6936106512018
LAMBDA  :  0.132144141920378
```

The function takes fewer steps to converge when we introduce a threshold value on accuracy. Without the threshold it took 27 steps and with the threshold it took just 18 steps to converge. The minimum found in the previous case was the actual minimum and in this case the algorithm was forced to declare convergence as the threshold value of accuracy was satisfied.

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```
Number of function calls taken for the optimize function to  find minimum :  3

The minimum found by the optimize function :

MIN MSE :  0.171999614458471
LAMBDA  :  35
```

Since the function is plateaued towards the lower bound from 35 and has a peak as lambda value increase from 35, the algorithm declates convergence at the local optima. This is the reason the number of steps taken by this algorithm is so less.

This function depends heavily on the initial point we specify as the start. If our initialization is bad the function will get stuck at a local optima. The optimize funcion took in a list of values to search over and find the minimum, this is the reason the convergence found by that function was better.