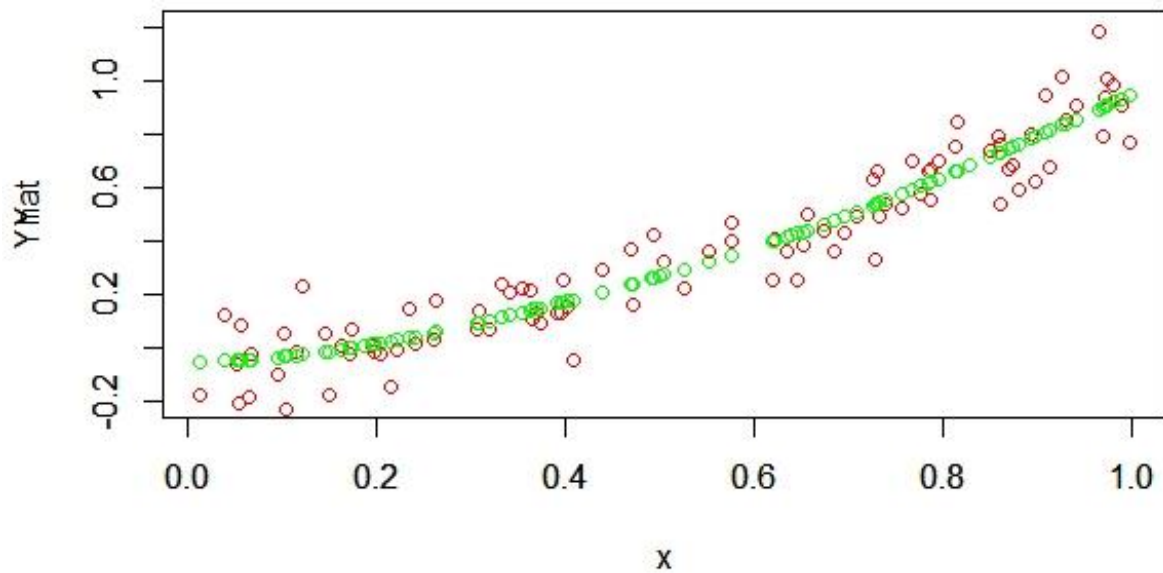


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HW 7 Submission:

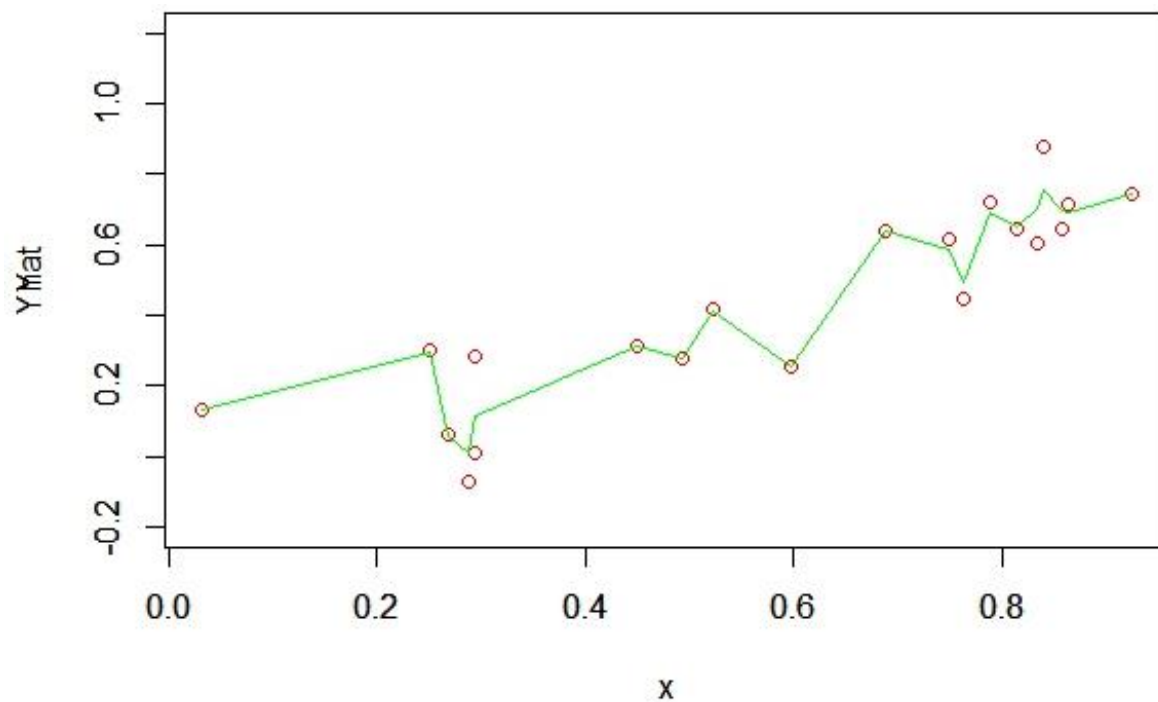
Performance Function:



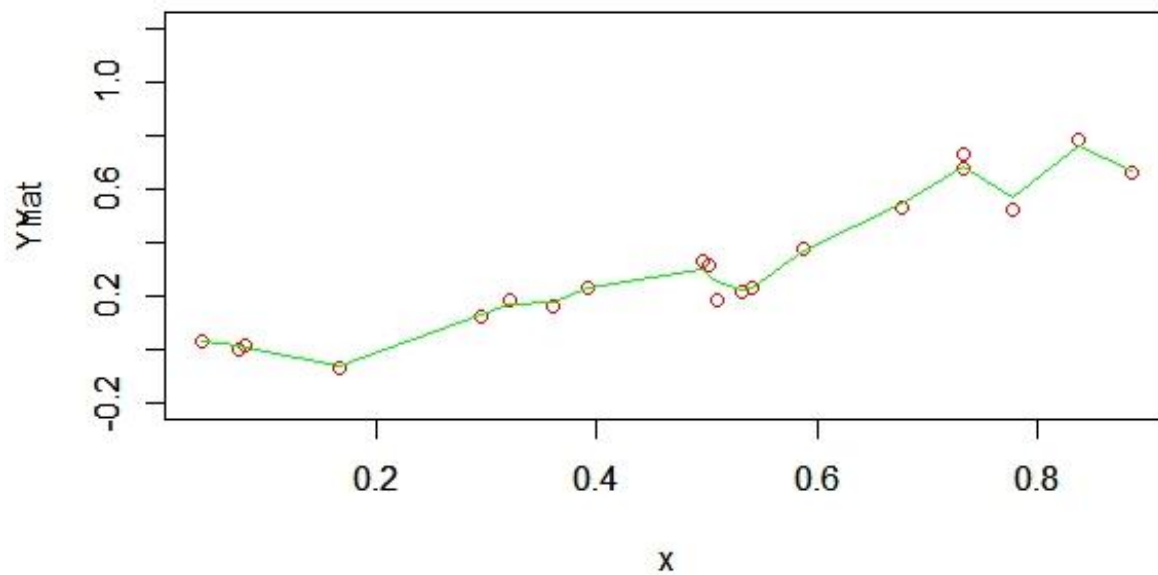
```
> comparison
      test replications elapsed relative user.self sys.self user.child sys.chi
1d
2 performance_RCcpp()          1    2.99    1.000      2.63    0.09         NA
NA
1  performance_R()          1 2535.23  847.903   2513.36    0.78         NA
NA
3 performance_Byte()          1 4261.19 1425.147   2112.72    0.39         NA
NA
> comparison[,c(1,3:4)]
      test elapsed relative
2 performance_RCcpp()    2.99    1.000
1  performance_R() 2535.23  847.903
3 performance_Byte() 4261.19 1425.147
```

Plots of the learned spline curves for different values of lambda:

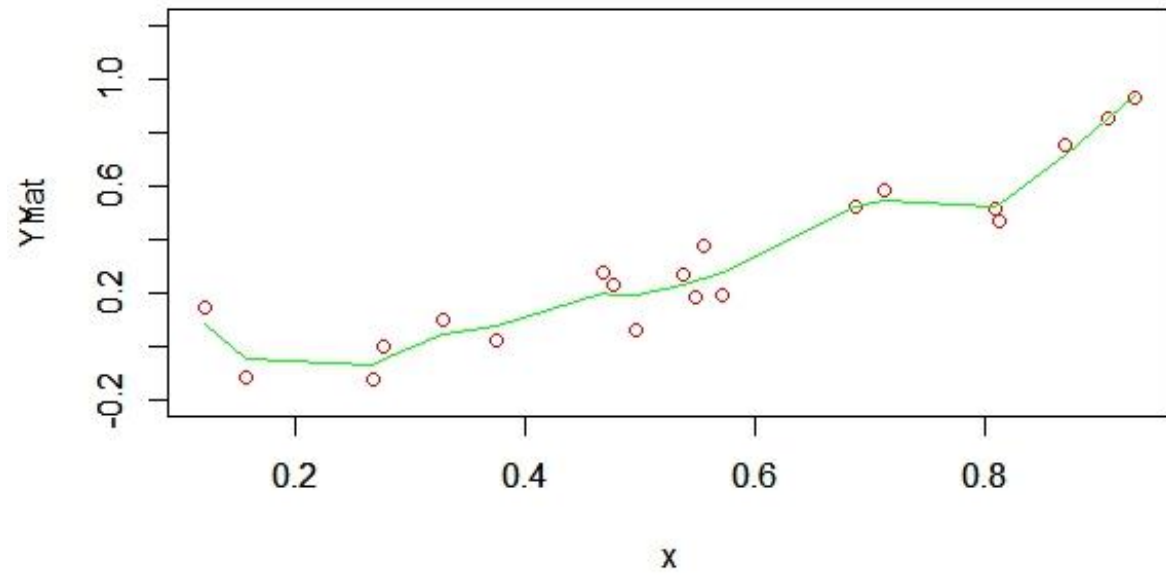
Lambda= 0.0001



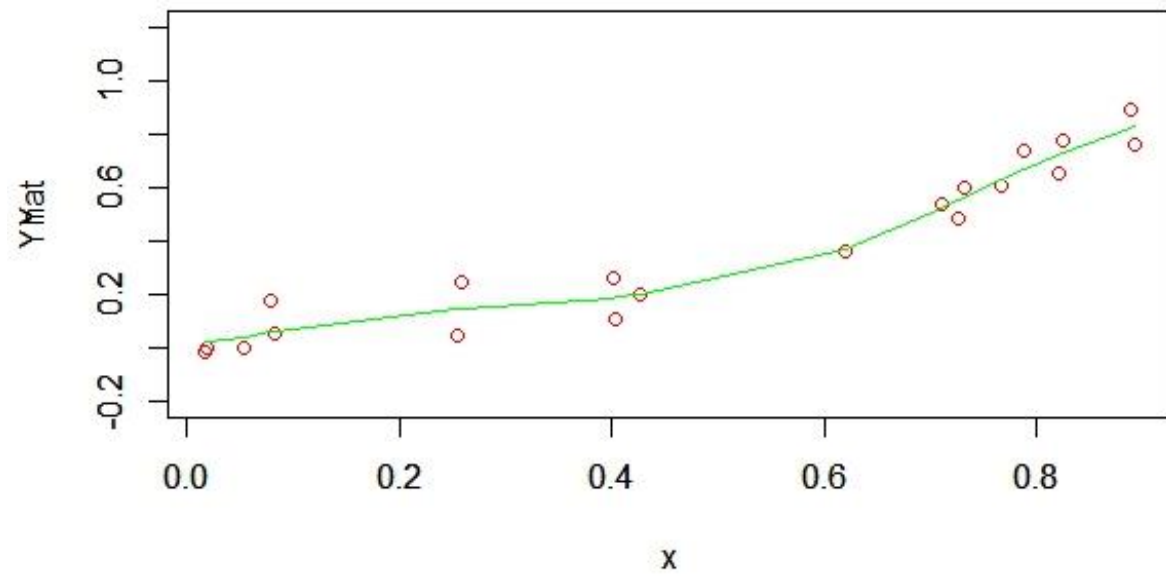
Lambda = 0.001



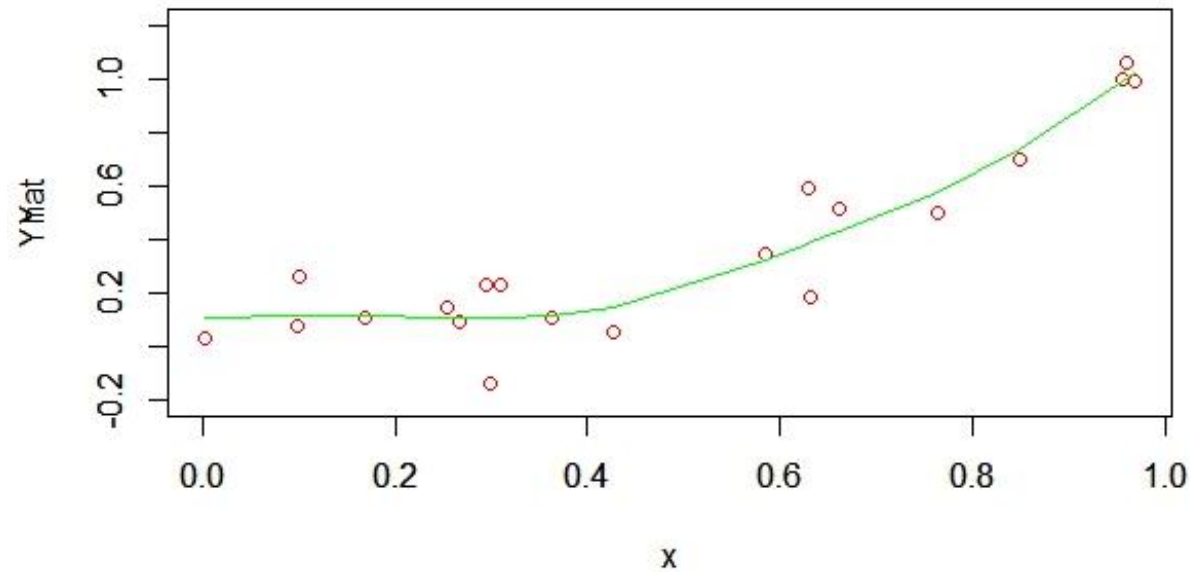
Lambda = 0.01



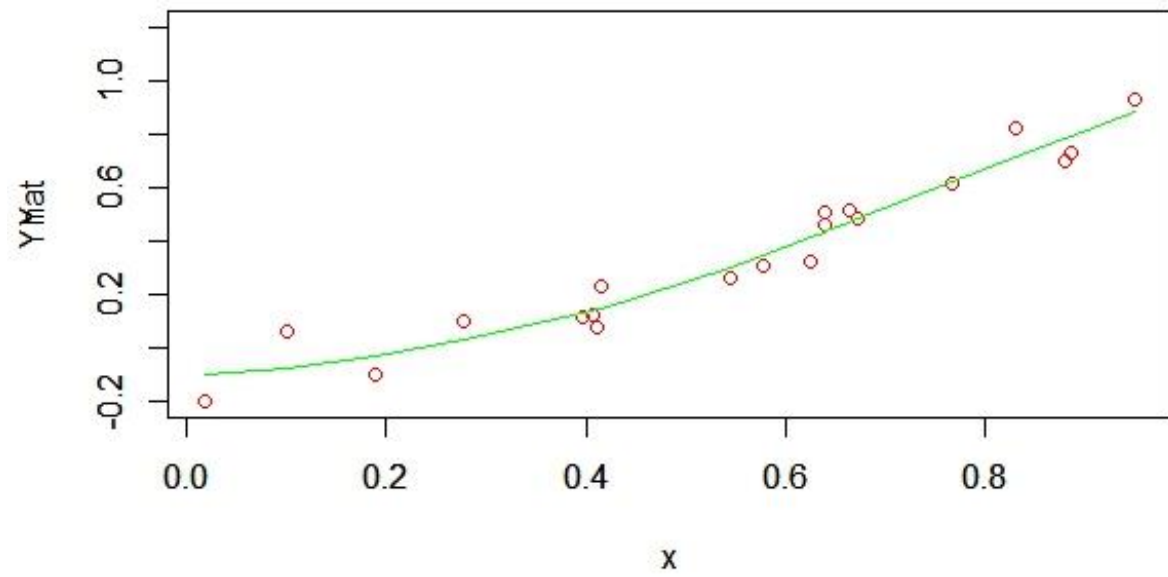
Lambda = 0.1



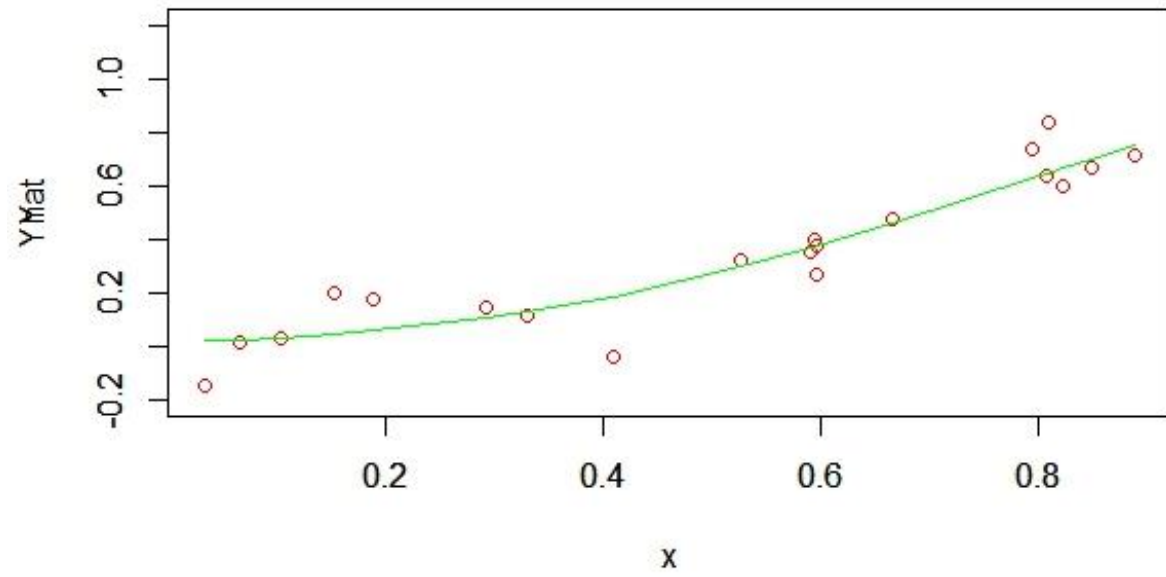
Lambda = 0.5



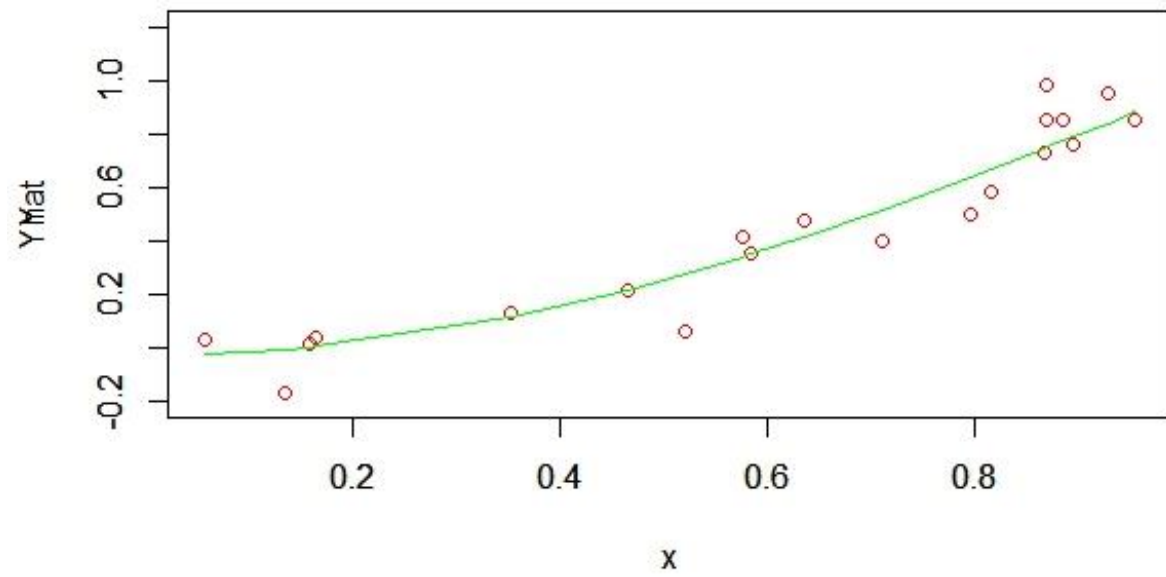
Lambda = 1



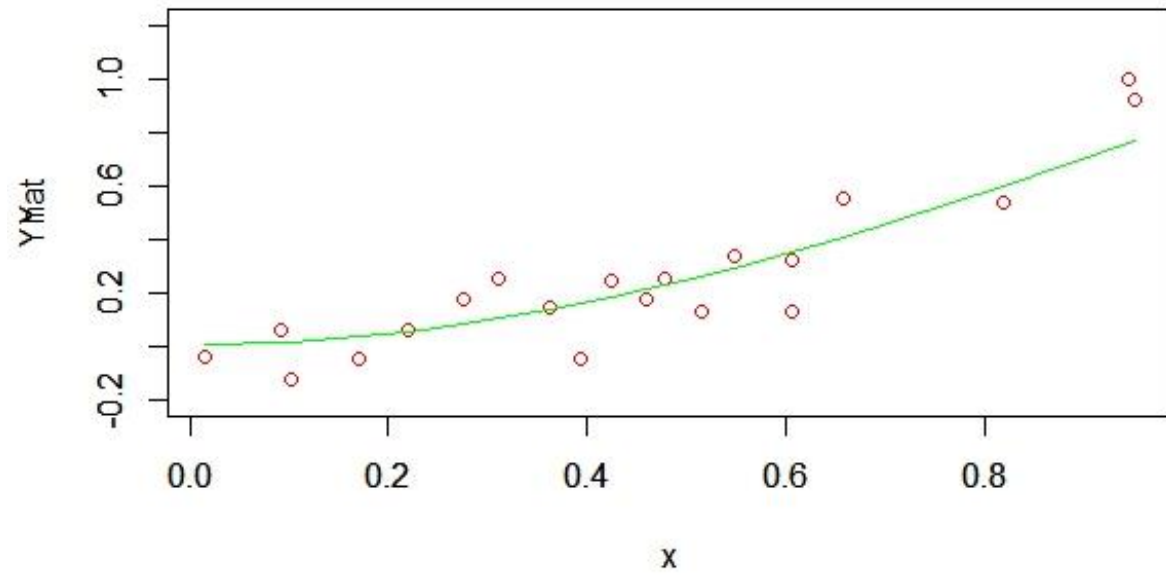
Lambda=10



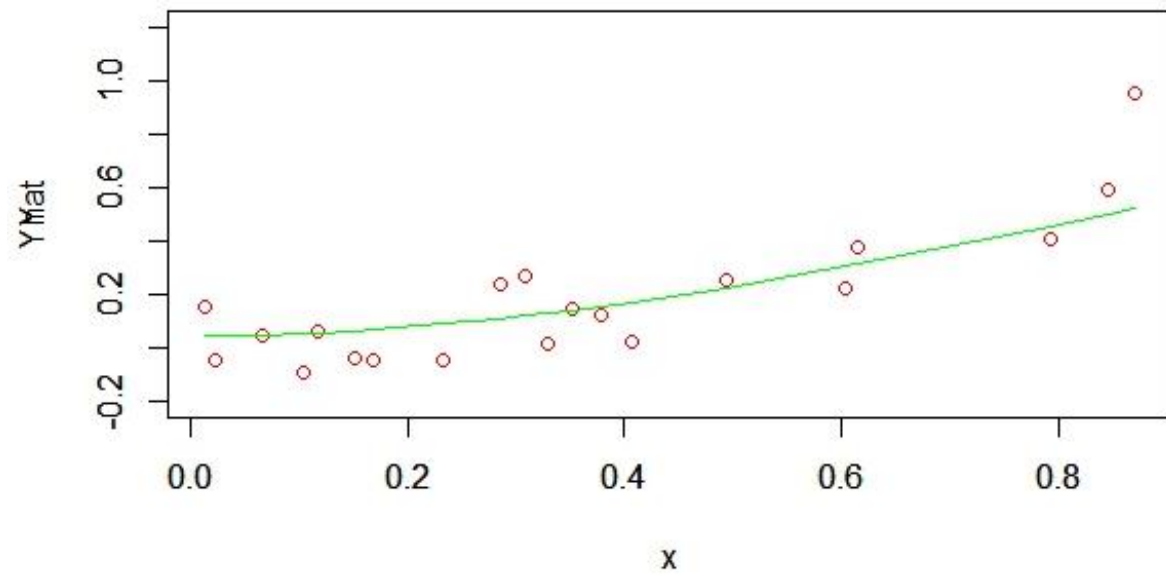
Lambda=25



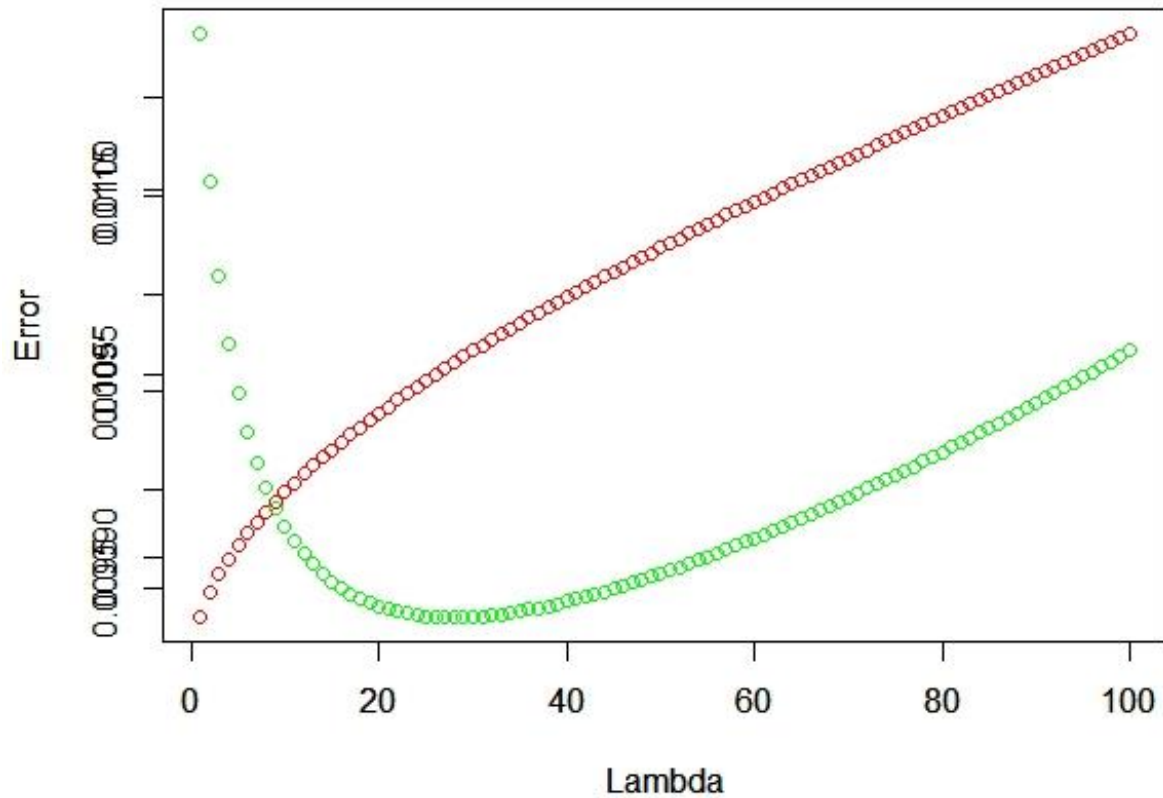
Lambda=50



Lambda=100



Training and Testing Plots for Spline Curves:



Green is the Testing Error and Red is the Training Error.

At a lower value of Lambda, the model is overfitting the data. Later the model improves. Towards the very end, it again starts under fitting.