Labs4

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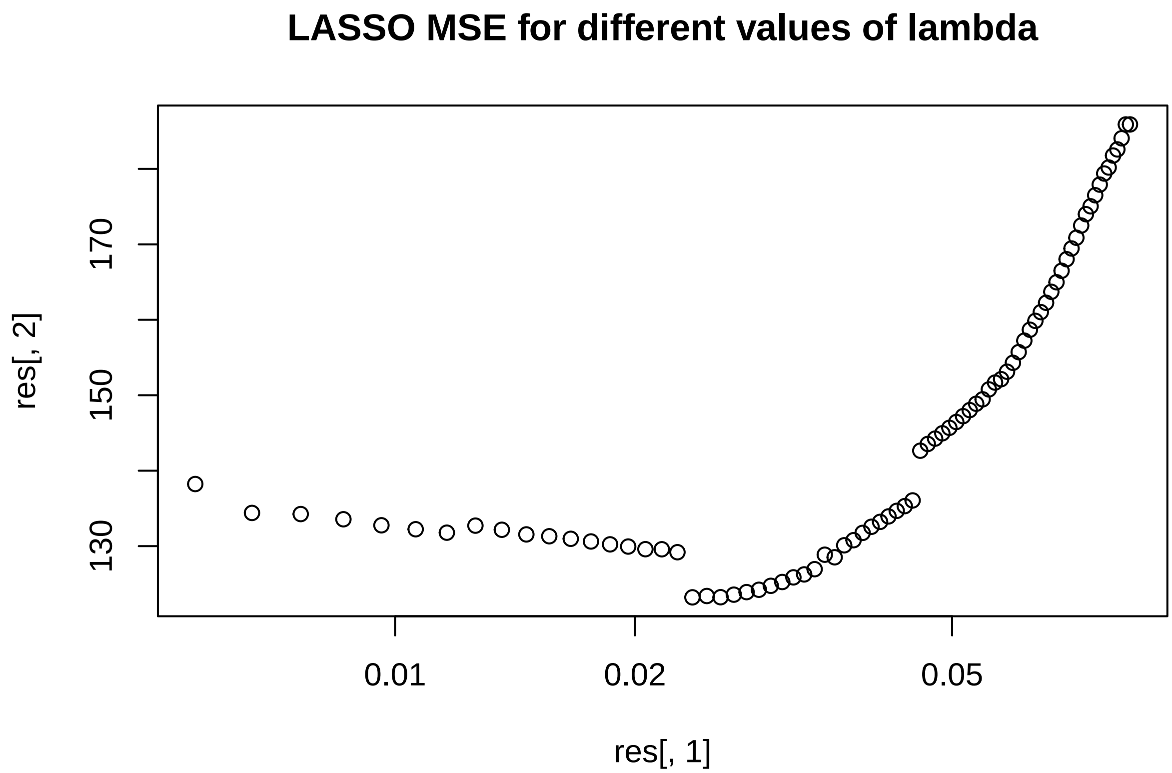
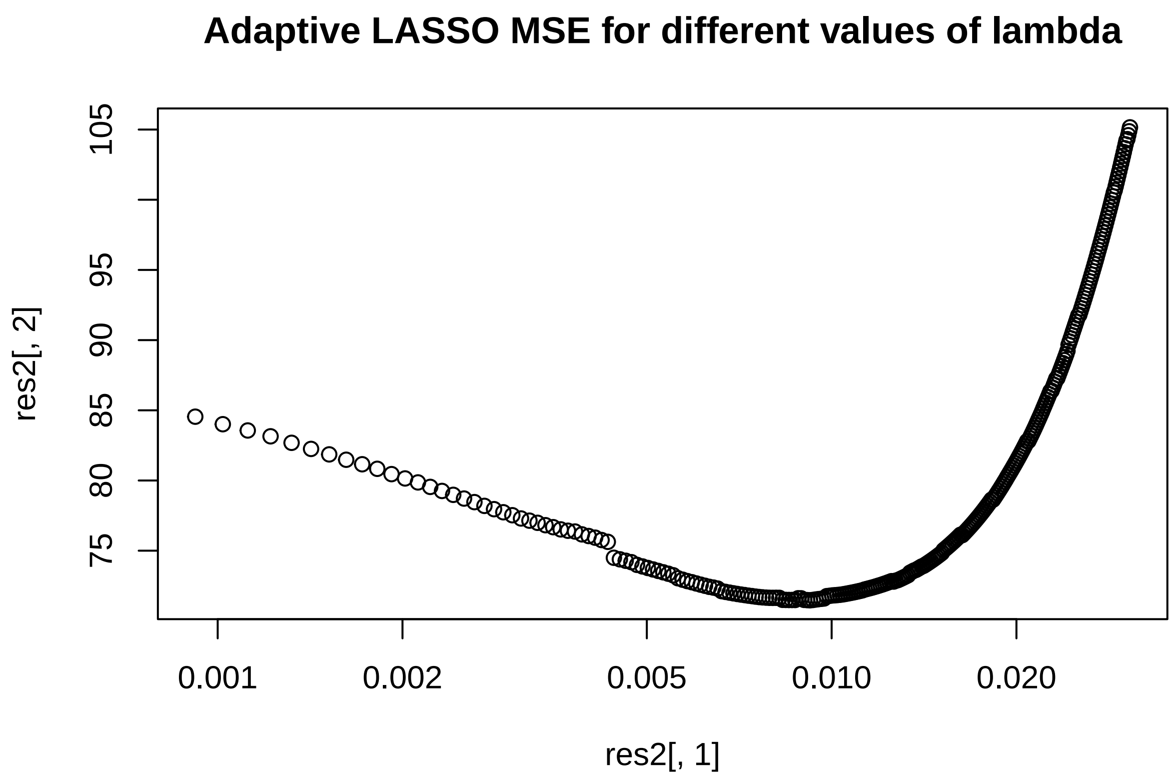
Task 1

Found maximal k for which the LASSO identifiability condition is satisfied was equal to 31.



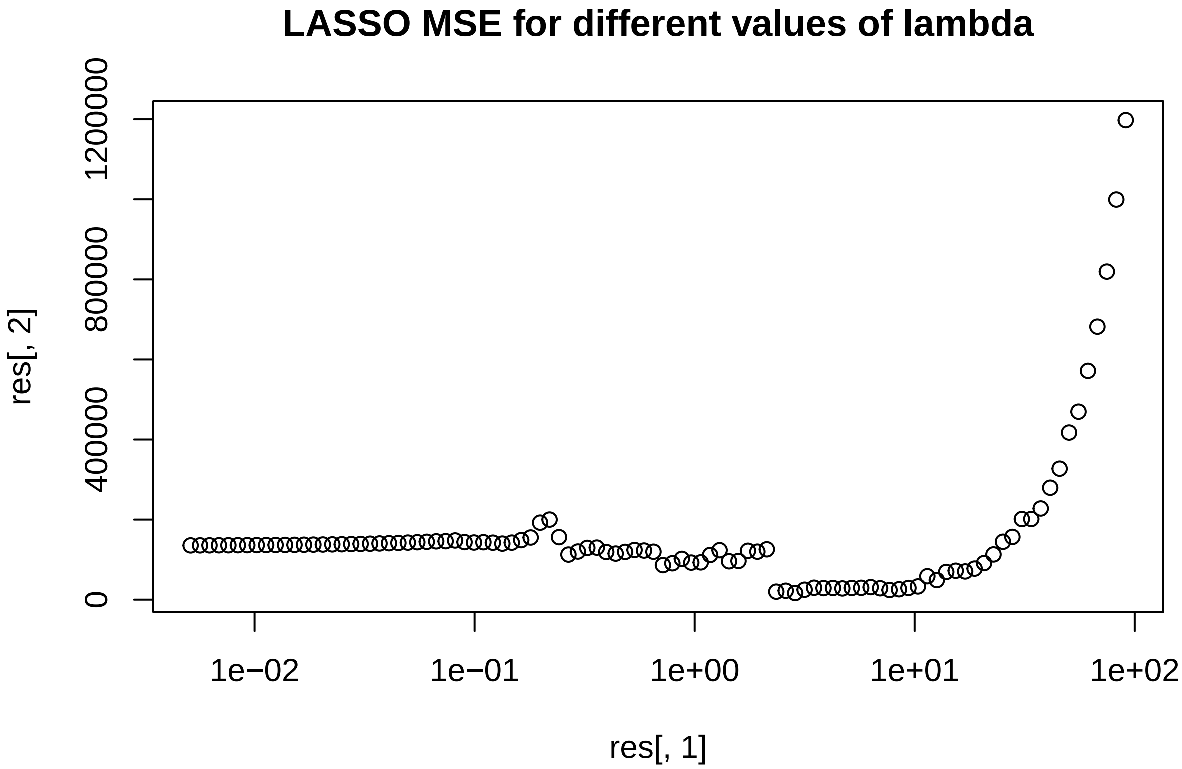


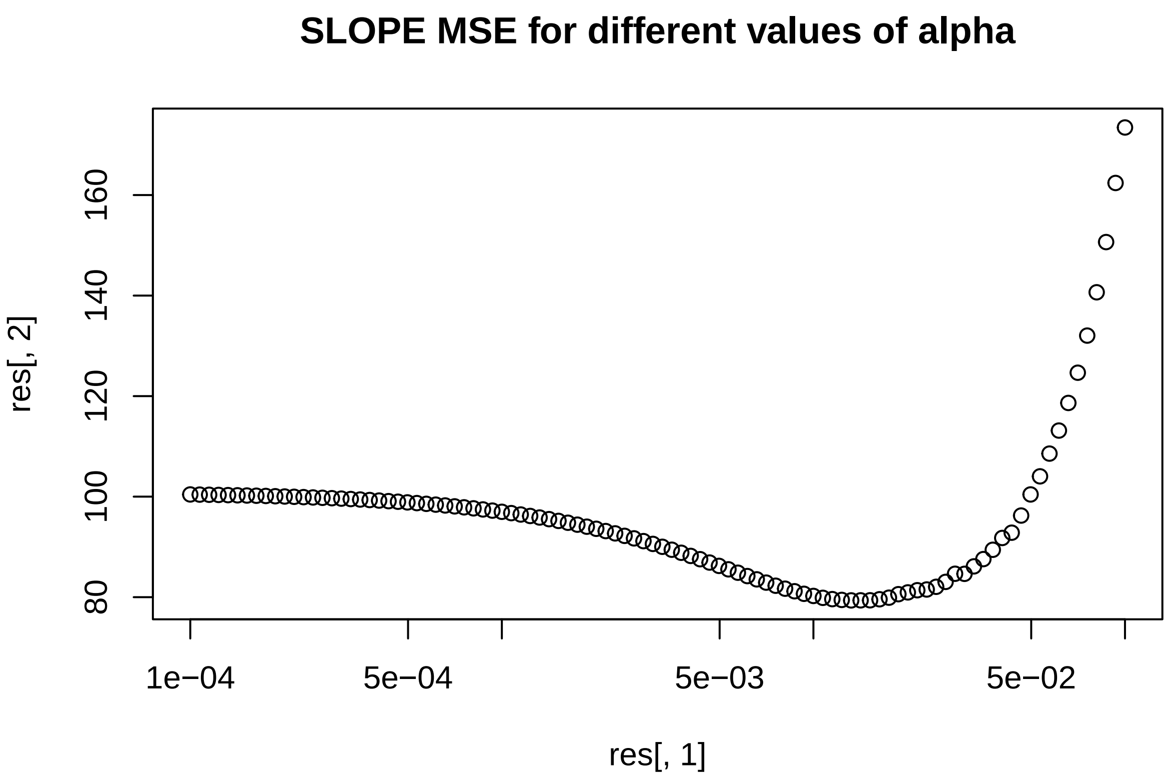
Two plots above shows values of MSE for different values of parameter.

```
##            Model     optimal_lambda              MSE TD FD
## 1          LASSO 0.0236136869738484 123.214595452156 31 68
## 2 adaptive LASSO 0.0092193073326052 71.4686347655294 31 31
```

We can see that adaptive LASSO achieved smaller MSE than usual LASSO. Both models discovered all of the true non-zero variables, but LASSO made much more false discoveries than adaptive LASSO - 68 compared to 31.

Task 2

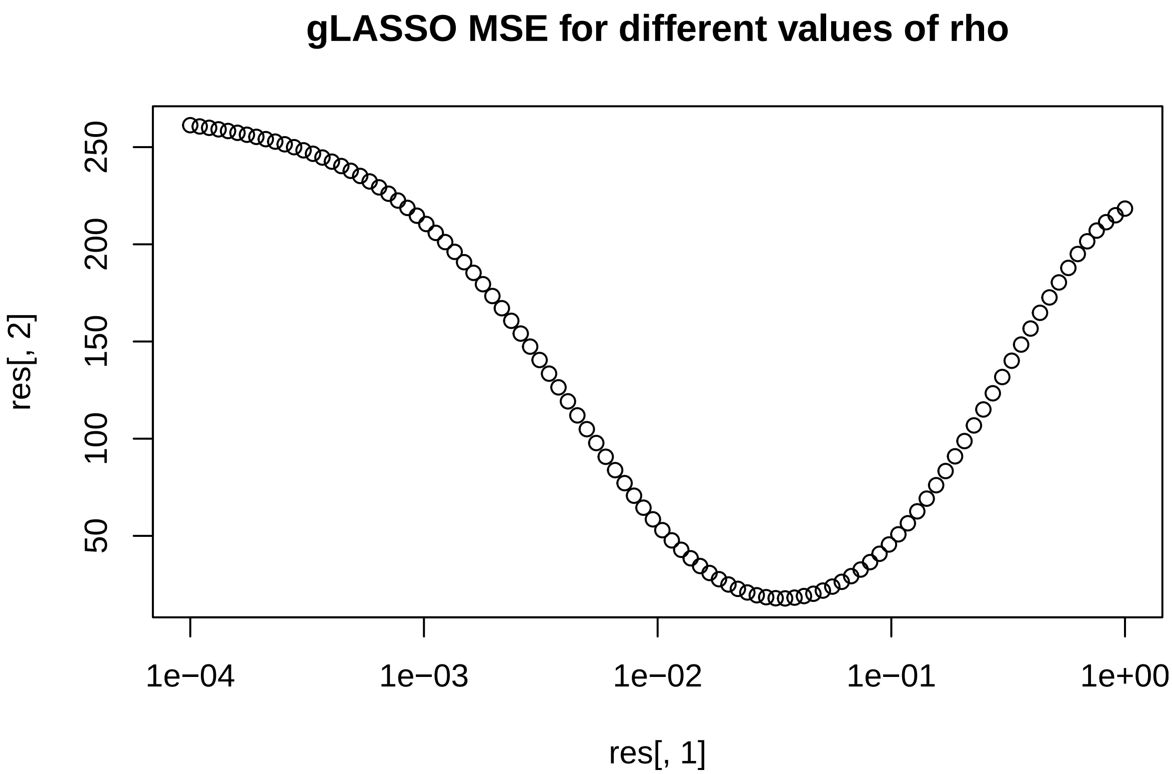





```
##   Model  optimal_parameter              MSE
## 1 LASSO   2.86254732301848 16490.1956960609
## 2 SLOPE 0.0132194114846603 86.3267953356615
```

From table above we can see, that SLOPE performs much better in terms of MSE when data is highly correlated than the LASSO does.

Task 3




```
##              Model              MSE
## 1 InverseSampleCov 268.071058645109
## 2           gLASSO 17.8225356891541
```

As expected gLASSO does much better than simple inverse of the sample covariance matrix as it is designed to not make false edges between separate components of graph.