# ASM Practice

Ridge Regression

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## Choosing the penalization parameter $\lambda$

1. Ridge regression lambda search
2. Ridge regression lambda search with CV
3. Prostate data application

```
## With validtion data of size 30 instances.
```

```
##        lambda        mspe         df
## 1    0.000000    30.85271   8.000000
## 2    4.624819    53.86405  10.045081
## 3   30.638584   156.63810   8.264344
## 4  176.961295 91724.40386 -30.687911
## 5 1000.000000   102.44067   1.407376
```

```
## With 5-fold and 10-fold Cross Validation respectively.
```

```
##        lambda       mspe        df
## 1    0.000000    5.29888  8.000000
## 2    4.624819   31.68800 10.688523
## 3   30.638584  147.34474 10.112368
## 4  176.961295 4177.15665  7.569466
## 5 1000.000000   22.99330  1.475407
```

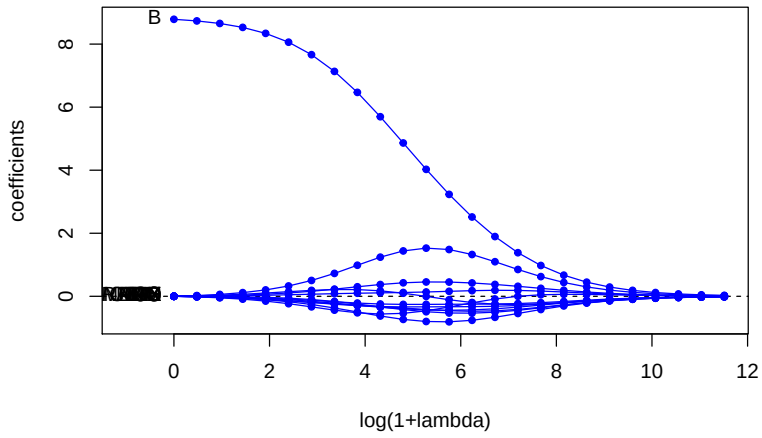
```
##        lambda        mspe        df
## 1    0.000000    5.115669  8.000000
## 2    4.624819   35.029383 10.741871
## 3   30.638584  163.523768 10.338854
## 4  176.961295 4963.432557  9.540335
## 5 1000.000000   23.041957  1.475667
```

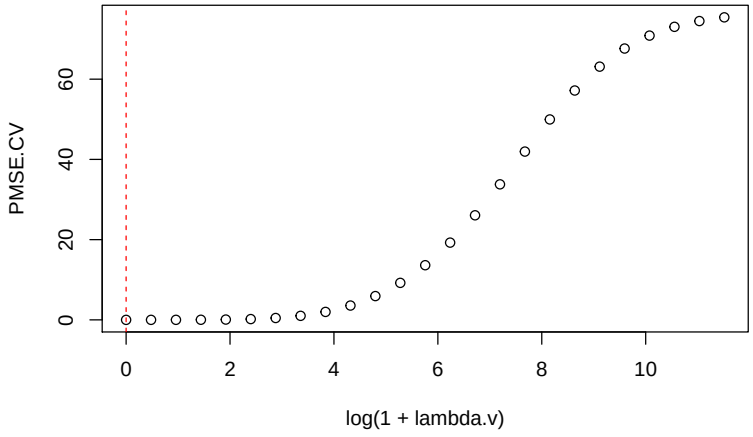
```
## With LOOCV (from n-CV and estimate)  and GCV estimate respectively.
```

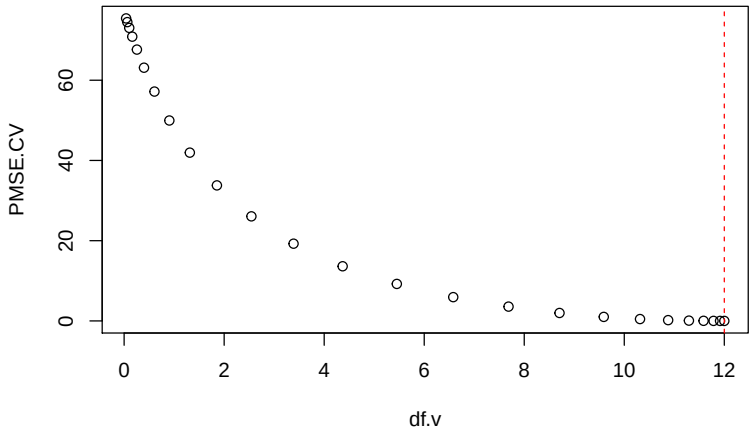
```
##        lambda         mspe         df
## 1    0.000000 5.294549e-01   8.000000
## 2    4.624819 1.806687e+01  10.083642
## 3   30.638584 8.739965e+01   8.300243
## 4  176.961295 3.307965e+05 -74.743242
## 5 1000.000000 1.387360e+01   1.407389
```

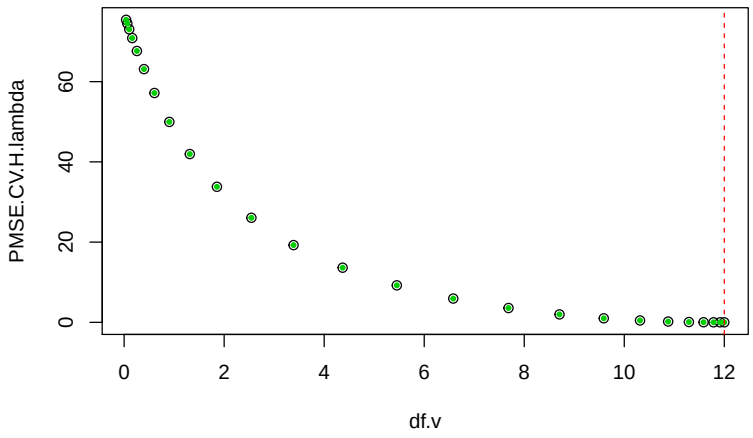
```
##        lambda       loocv          gcv          df
## 1    0.000000   0.5294549    0.5274036    8.000000
## 2    4.624819   0.6652560    0.6459648   10.032356
## 3   30.638584   1.4948719    1.4116525    8.158653
## 4  176.961295 924.4076587 1411.1336574 -131.992443
## 5 1000.000000   1.3480901    1.3621288    1.399439
```

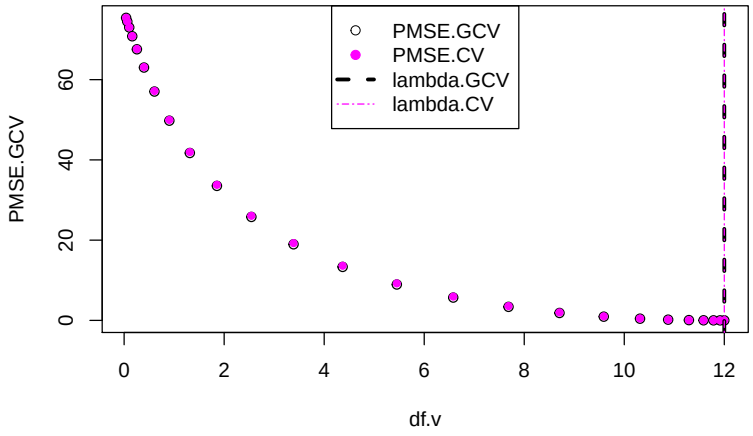
# Ridge regression for the Boston Housing data




PMSE.CV.H.lambda
0
20
40
60
0
2
4
6
8
10
12
df.v


PMSE.GCV
PMSE.CV
lambda.GCV
lambda.CV
PMSE.GCV
0
20
40
60
0
2
4
6
8
10
12
df.v