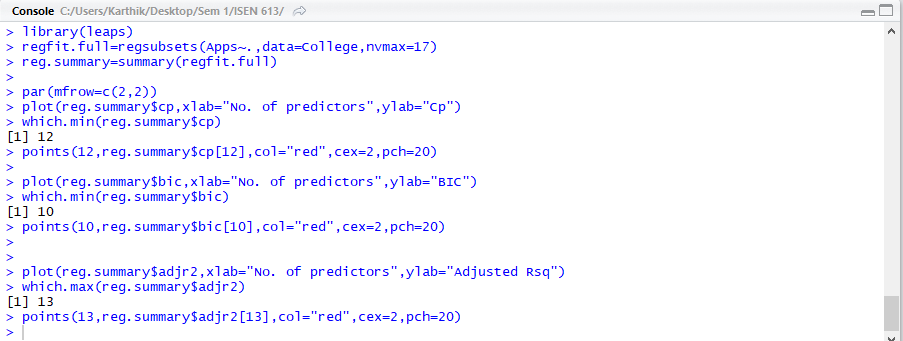
1)

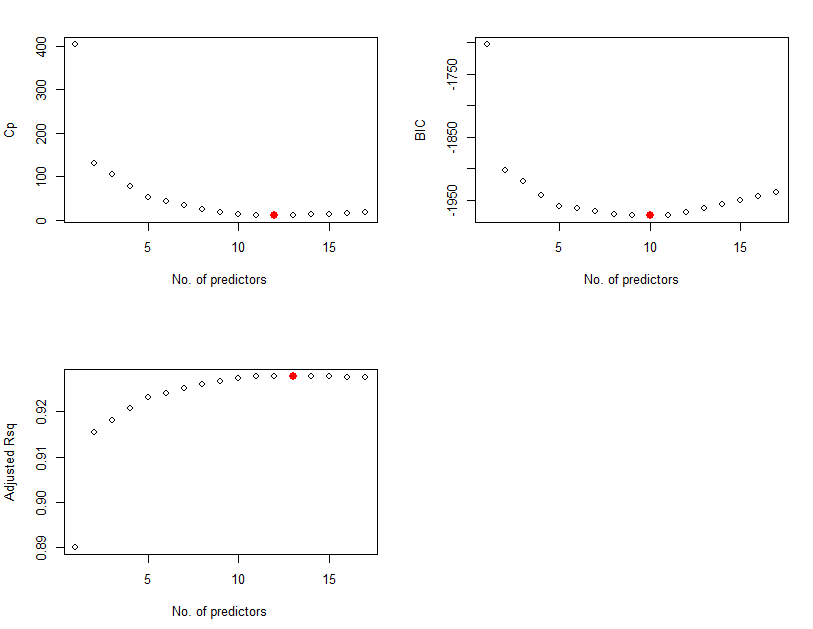
a)



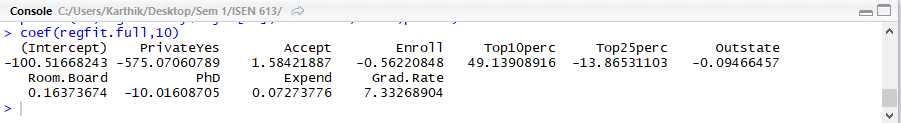
Cp -12 predictor model

BIC – 10 predictor model

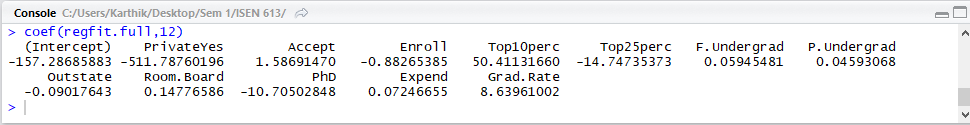
AdjR2 – 13 predictor model



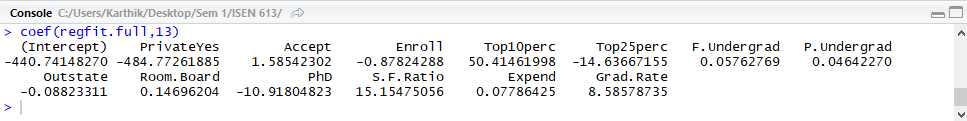
Coefficient estimates For BIC:



Coefficient estimates For Cp :

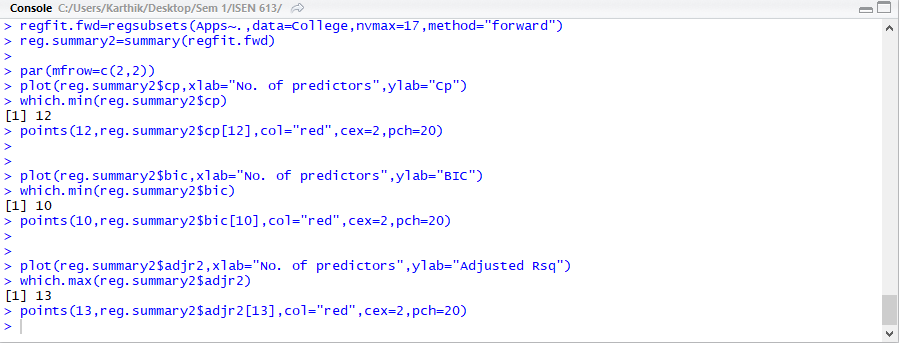


Coefficient estimates For AdjR2:



b)

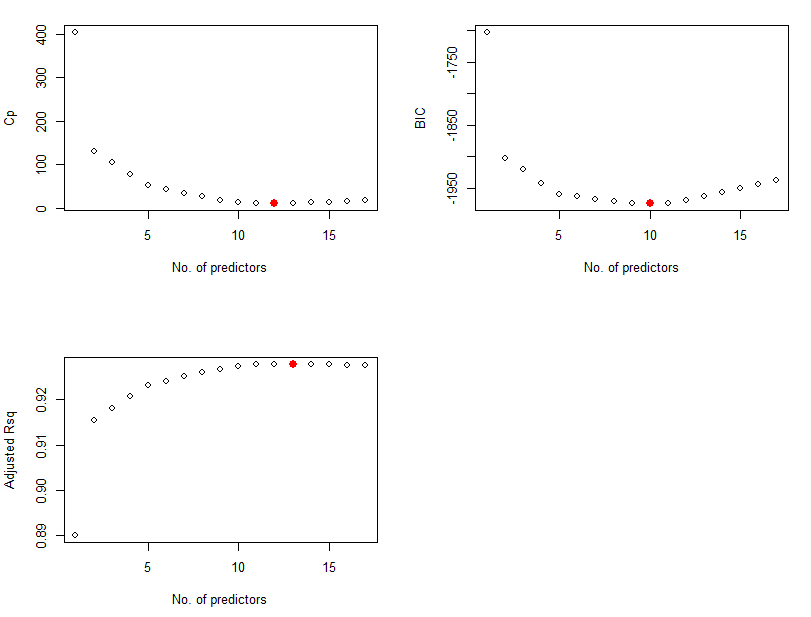
FORWARD:



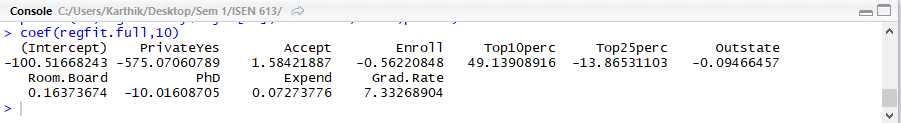
Cp -12 predictor model

BIC – 10 predictor model

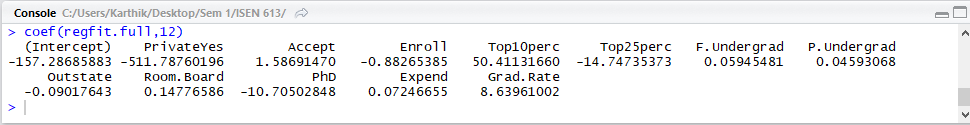
AdjR2 – 13 predictor model



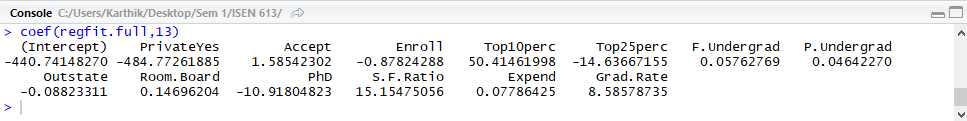
Coefficient estimates For BIC:



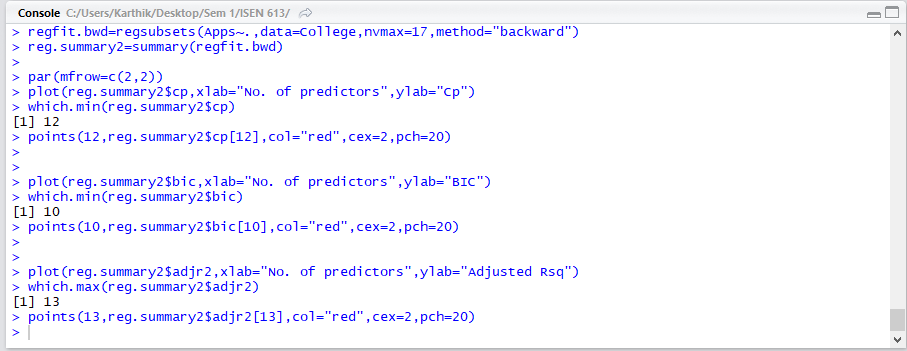
Coefficient estimates For Cp :



Coefficient estimates For AdjR2:



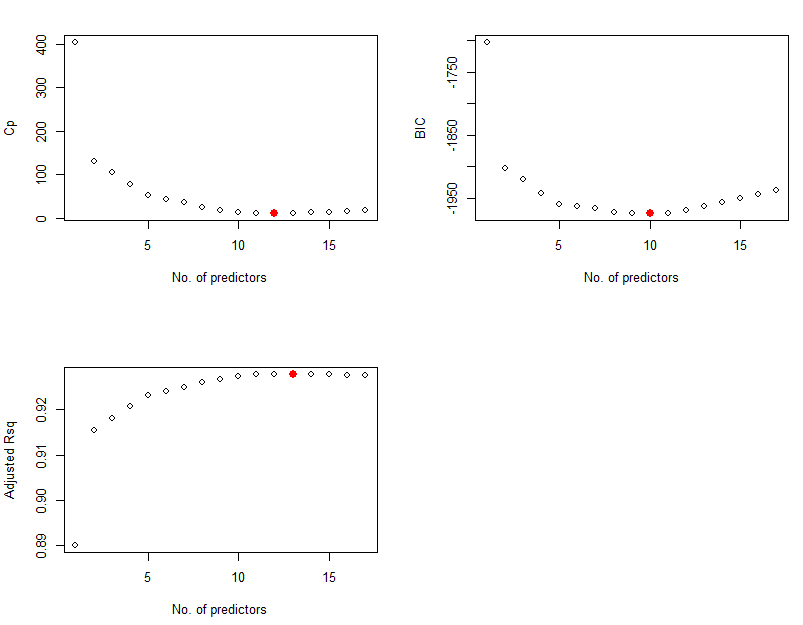
BACKWARD:



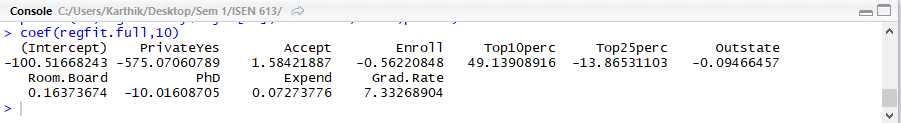
Cp -12 predictor model

BIC – 10 predictor model

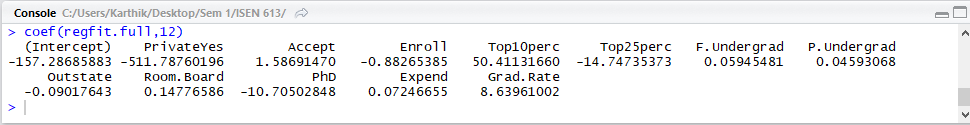
AdjR2 – 13 predictor model



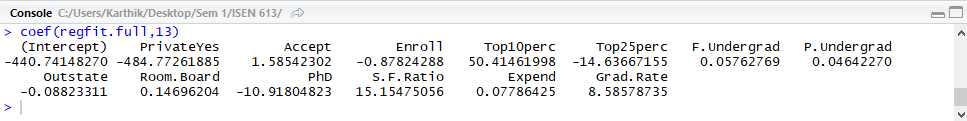
Coefficient estimates For BIC:



Coefficient estimates For Cp :

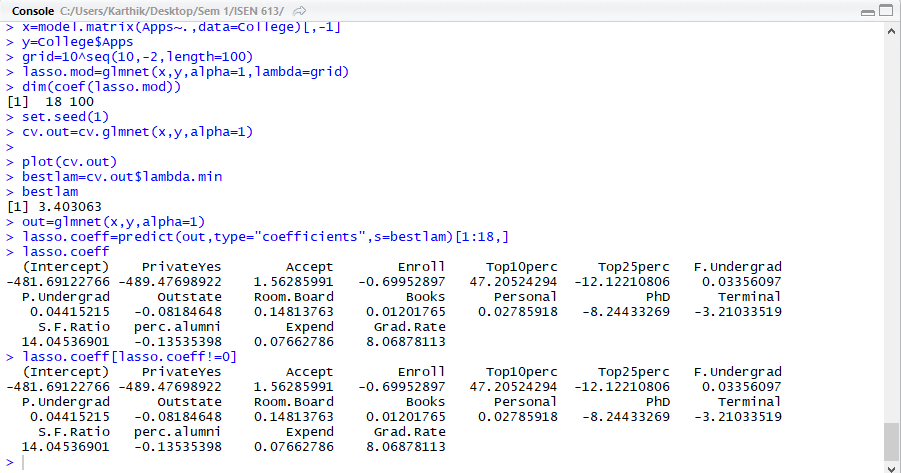


Coefficient estimates For AdjR2:

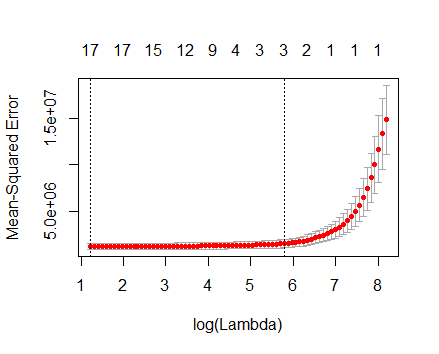


The results are the same for both best sub set selection and the forward and backward stepwise selection methods.

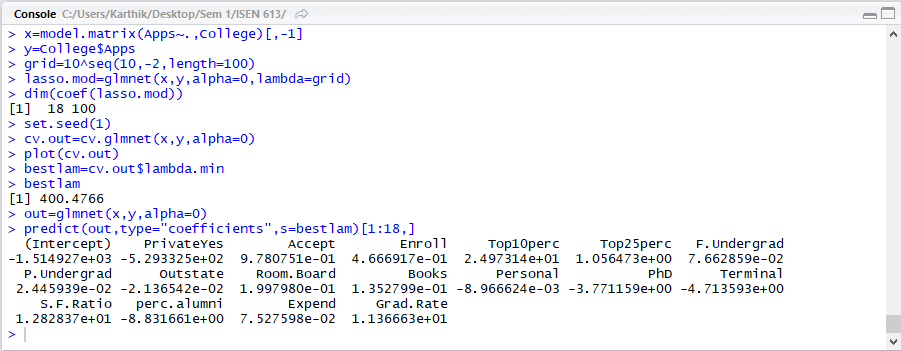
c)



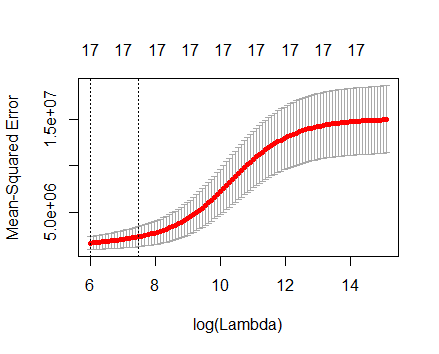
Best lambda: 3.403



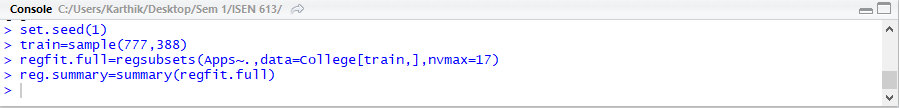
4)



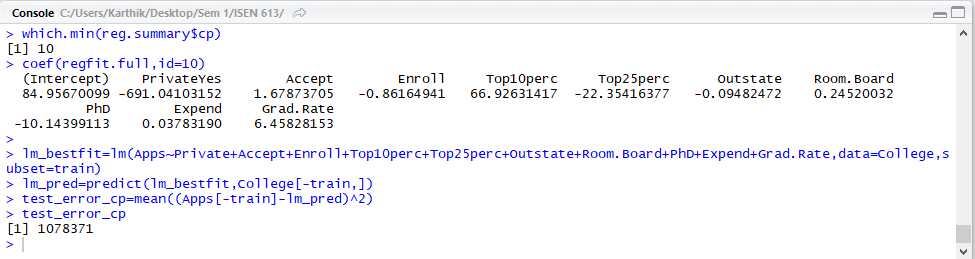
Best lambda: 400.4766



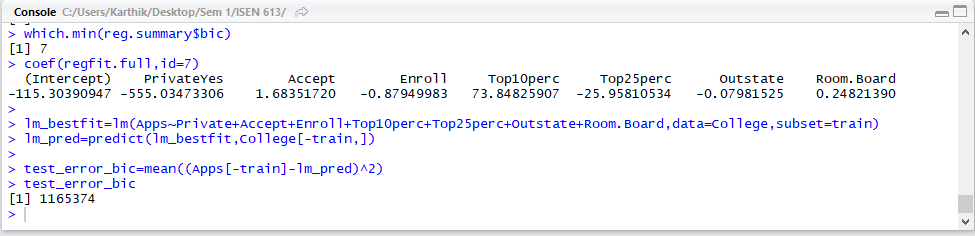
e-i)



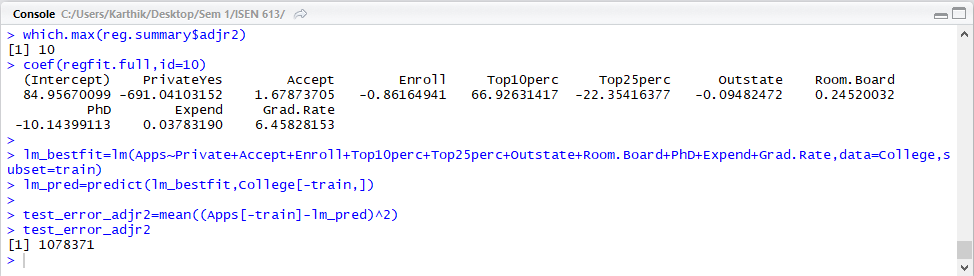
If Cp is used:



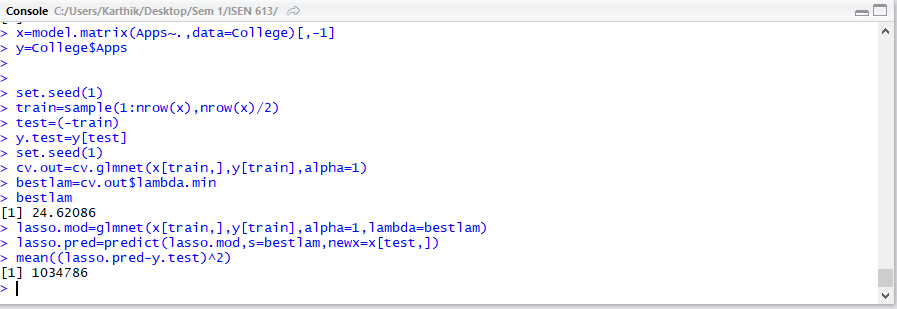
If BIC is used (Chosen in the first question as the best model):



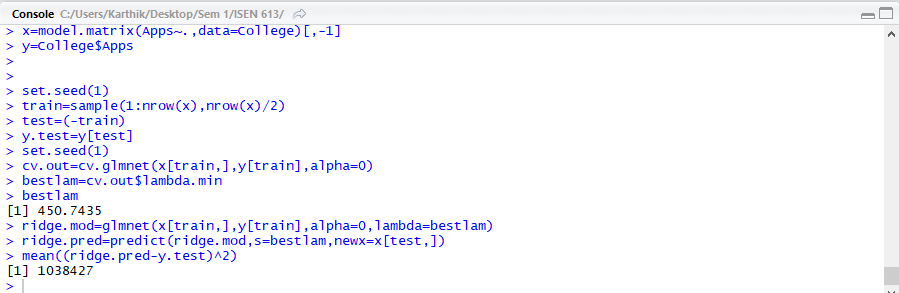
If AdjR2 is used:



e - ii)



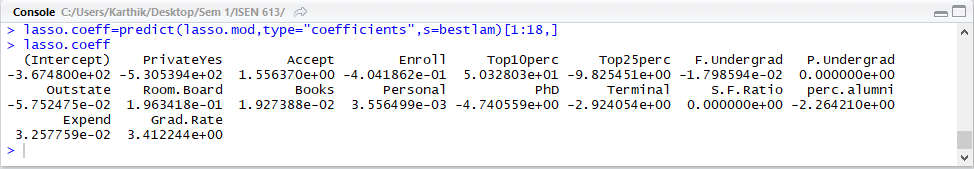
e-iii)



e-iv)

|  |  |
| --- | --- |
| **Model** | **Test Error** |
| Best Subset Selection (Cp) | 1078371 |
| Best Subset Selection (BIC) (CHOSEN as best among best subset selection in Q1) | 1165374 |
| Best Subset Selection (AdjR2) | 1078371 |
| **Lasso Regression** | **1034786** |
| Ridge Regression | 1038427 |

Lasso Coefficient estimates:



Lasso regression seems to give the lowest test error and hence is the optimal model.