

Stats243 Problem Set 7

Mengling Liu

Nov 2017

Collaboration: I discussed with Rui Chen and Fan Dong for this homework set.

4.

```
beta_hat <- function(A,X,Y,b){
  R <- qr.R(qr(X))
  Q <- qr.Q(qr(X))
  R1 <- qr.R(qr(t(A)%%solve(R))))
  backsolve(R, backsolve(R, crossprod(X,Y)+t(A) %%%
                        backsolve(R1,backsolve(R1,-A%%backsolve(R, crossprod(Q,Y))+b,
                        transpose = T)),transpose = T))
}

m <- 1000
n<-1000
p <- 1000
A <- matrix(rnorm(m*p), nrow = m)
X <- matrix(rnorm(n*p), nrow = n)
Y <- rnorm(n)
b <- rnorm(m)
d <- t(X)%%Y
C <- crossprod(X)

system.time(solve(C)%%d + solve(C)%%t(A)%%solve(A%%solve(C)%%t(A))%%(-A%%(solve(C)%%d)+b))

##      user  system elapsed
##    10.97    0.08    11.17

system.time(beta_hat(A,X,Y,b))

##      user  system elapsed
##     5.37    0.07    5.43
```