

Stats 100C: HW5 due Friday 5/8/09 (in class)

Page 134-142. Exercises 4.2, 4.6(a)-(d), 4.14(a)-(d), and extra exercise.

Extra Exercise. Consider the following simple regression model for which $\epsilon_i \sim N(0, \sigma^2)$.

$$\begin{aligned}y_1 &= \beta_0 + 0.5\beta_1 + \epsilon_1 \\y_2 &= \beta_0 - \beta_1 + \epsilon_2 \\y_3 &= \beta_0 + 0.5\beta_1 + \epsilon_3\end{aligned}$$

- Write the above model in matrix form.
- Find the least squares estimates using vectors and matrices.
- Find the variance-covariance matrix of $\hat{\beta}$.
- Find the hat matrix H . Verify that the sum of the diagonal elements of the hat matrix is equal to 2 ($\sum_{i=1}^n h_{ii} = p + 1$).

Hint: You can read the data into R for exercise 4.14 using the following commands

```
dat=read.table("http://www.stat.ucla.edu/~hqxu/stat100C/data/bsemen.txt", h=T)
attach(dat) # so you can use variable Y, X1, X2, X3
par(mfrow=c(1,3)) # to have 3 plots in a row
```