

Homework 5 - Statistics 215a - Fall 2004 - D. R. Brillinger

The solution to this homework is due October 7.

Consider minimizing the OLS sum of squares when β is subject to the restriction $A\beta = c$. Here A is a known q by p matrix of rank q and c is a known q by 1 vector. We are after the β providing

$$\min_{A\beta=c} (y - X\beta)^T(y - X\beta)$$

1. Show that the answer is

$$b_H = b + (X^T X)^{-1} A^T [A (X^T X)^{-1} A^T]^{-1} (c - Ab)$$

where b is the OLS estimate we have been studying. (We are assuming that X is of full rank for now.)

2. Show that

$$|y - Xb_H|^2 = |y - Xb|^2 + |X(b - b_H)|^2$$

Eventually we will see why the subscript H is used.

P.S. We are writing $|a|^2 = a^T a$ for vectors a .