线性回归分析第 8 周作业

Prob1 KNNL5.4 KNNL5.12

*5.4. **Flavor deterioration.** The results shown below were obtained in a small-scale experiment to study the relation between °F of storage temperature (X) and number of weeks before flavor deterioration of a food product begins to occur (Y).

i:	1	2	3	4	5
X_i:	8	4	0	−4	−8
Y_i:	7.8	9.0	10.2	11.0	11.7

Assume that first-order regression model (2.1) is applicable. Using matrix methods, find (1) $\mathbf{Y}'\mathbf{Y}$, (2) $\mathbf{X}'\mathbf{X}$, (3) $\mathbf{X}'\mathbf{Y}$.

*5.12. Refer to **Flavor deterioration** Problem 5.4. Find $(\mathbf{X}'\mathbf{X})^{-1}$.

Prob2 KNNL 5.23

*5.23. Refer to **Flavor deterioration** Problems 5.4 and 5.12.

a. Using matrix methods, obtain the following: (1) vector of estimated regression coefficients, (2) vector of residuals, (3) SSR, (4) SSE, (5) estimated variance-covariance matrix of $\mathbf{b}$, (6) point estimate of $E\{Y_h\}$ when $X_h = -6$, (7) estimated variance of $\hat{Y}_h$ when $X_h = -6$.

b. What simplifications arose from the spacing of the X levels in the experiment?

c. Find the hat matrix $\mathbf{H}$.

d. Find $s^2\{\mathbf{e}\}$.

Remark: For (c),find the hat matrix H and its rank,

and verify that H is idempotent

✧ Bonus Question

2）一列随机变量 X_i 期望为 0，方差为 1，两两之间相关系数为 p。

Y=a1X1+a2X2+...+anXn。用矩阵形式求 E(Y) Var(Y)。求 p 的最小值