

Recitation 7 - P8130 Fall 2017

October 27, 2017

Problem 1

Kutner textbook 5th edition, 1.5, 1.16, 1.18.

- 1.5 When asked to state the simple linear regression model, a student wrote it as follows $E(Y_i) = \beta_0 + \beta_1 X_i + \varepsilon_i$. Do you agree?
- 1.16 Evaluate the following statement: "For the least squares method to be fully valid, it is required that the distribution of Y be normal."
- 1.18 According to (1.17), $\sum e_i = 0$ when regression model (1.1) is fitted to a set of n cases by the method of least squares. Is it also true that $\sum \varepsilon_i = 0$? Comment.

Problem 2

Kutner textbook 5th edition, 1.21, 1.25.

1.21 *Airfreight breakage*

A substance used in biological and medical research is shipped by air-freight to users in cartons of 1,000 ampules. The data below, involving 10 shipments, were collected on the number of times the carton was transferred from one aircraft to another over the shipment route (X) and the number of ampules found to be broken upon arrival (Y). Assume that first-order regression model (1.1) is appropriate.

i	1	2	3	4	5	6	7	8	9	10
X_i	1	0	2	0	3	1	0	1	2	0
Y_i	16	9	17	12	22	13	8	15	19	11

- a. Obtain the estimated regression function. Plot the estimated regression function and the data. Does a linear regression function appear to give a good fit here?
- b. Obtain a point estimate of the expected number of broken ampules when $X = 1$ transfer is made.
- c. Estimate the increase in the expected number of ampules broken when there are 2 transfers as compared to 1 transfer.
- d. Verify that your fitted regression line goes through the point (\bar{X}, \bar{Y}) .

1.25 *Airfreight breakage*

- a. Obtain the residual for the first case. What is its relation to ε_1 ?
- b. Compute $\sum e_i^2$ and MSE. What is estimated by MSE?