STAT GU4205/GR5205 (Section 004) Linear Regression Models

Fall 2019

Practice Questions

1. Suppose that $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$, where x_i's are constant and ε_i's are independent normal random variables with mean 0 and variance σ^2. Compute the likelihood at $(\beta_0, \beta_1) = (0.1, 1)$ when we have the following data.

observation	1	2	3
x	1	2	3
y	1.5	2	2

2. Suppose that the regression model is $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$. We have $n = 6$ observations. The summary statistics are as follows: $\sum y_i = 8.5, \sum x_i = 6, \sum x_i^2 = 16, \sum x_i y_i = 15.5, \sum y_i^2 = 17.25$.

   (a) Compute the least square point estimates of β_0 and β_1.

   (b) Calculate SSE and MSE.

   (c) Use a 5% level of significance to conduct the test of $H_0 : \beta_1 = 0$ vs $H_1 : \beta_1 \neq 0$. Remark: t(0.95, 4) = 2.132, t(0.975, 4) = 2.776.

3. (a) (T/F) Suppose that the 95% confidence interval of β_1 is found to be $[1, 2]$. Then, the probability of β_1 lies in this interval is 0.95.

   (b) (T/F) A useful tool for assessing the appropriateness of model assumptions is a residuals versus fitted values plot; if the model assumptions hold, this should resemble a null plot.