Econometrics I's Homework

Deadline: July 1, 2020, PM23:59:59

- The answer should be written in English or Japanese.
- Your name and student ID number should be included in your answer sheet.
- Send your answer to the email address: `tanizaki@econ.osaka-u.ac.jp`.
- The subject should be Econome 1 or 　　 1. Otherwise, your mail may go to the **trash box**.

<div></div>　　Suppose that u_1, u_2, $\cdots$, u_T are mutually independently and normally distributed with $\mathrm{E}(u_t) = 0$ and $\mathrm{V}(u_t) = \sigma^2$ for all $t = 1, 2, \cdots, T$.

Consider the following regression model:

$$y_t = \alpha + \beta x_t + u_t$$

Answer the following questions.

(1) Construct the likelihood function of $(\alpha, \beta, \sigma^2)$.

(2) Obtain the maximum likelihood estimator of $\theta = (\alpha, \beta, \sigma^2)'$, denoted by $\tilde{\theta} = (\tilde{\alpha}, \tilde{\beta}, \tilde{\sigma}^2)'$.

(3) Obtain the information matrix $I(\theta)$.

(4) Compare OLSE (i.e., $\hat{\beta}$) and MLE (i.e., $\tilde{\beta}$) of β with respect to mean and variance. How about OLSE (i.e., s^2) and MLE (i.e., $\hat{\sigma}^2$) of σ^2?