

Econometrics I's Homework

Deadline: July 8, 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 計量 1. Otherwise, your mail may go to the **trash box**.

1 Suppose that $\epsilon_1, \epsilon_2, \dots, \epsilon_T$ are mutually independently and normally distributed with $E(\epsilon_t) = 0$ and $V(\epsilon_t) = \sigma^2$ for all $t = 1, 2, \dots, T$.

Consider the following regression model:

$$y_t = \rho y_{t-1} + \epsilon_t, \quad \epsilon_t \sim N(0, \sigma^2)$$

Answer the following questions.

- (1) Obtain mean and variance of y for $y = (y_1, y_2, \dots, y_T)'$.
- (2) Using (1), construct the likelihood function of (ρ, σ^2) .
- (3) Obtain unconditional mean and variance of y_t . Obtain conditional mean and variance of y_t given y_{t-1}, y_{t-2}, \dots .
- (4) Using (3), construct the likelihood function in the innovation form.
- (4) Comparing the two likelihood function, obtain the matrix P such that $\omega = PP'$, where Ω denotes the variance obtained in (2).