

Assignments #05 of
Econometrics I & Advanced Econometrics I (2013SY)

Instruction to students

1. **Dead line for submission: 17:00 of May 31, 2013. Please submit your answer to the Office of the Educational Affairs.**
2. Use A4 size papers to answer.
3. The answer may be written in Japanese as well as English.

Q1

Prove Theorem 4.1.2, i.e. $(-1 \leq \text{Cor}(X,Y) \leq 1)$.

Q2

Suppose $f(x, y)$, the joint probability density function of X and Y , is given by

$$f(x, y) = \begin{cases} 6(y - x) & \text{for } 0 < x \leq y < 1 \\ 0 & \text{otherwise} \end{cases} .$$

In this case, answer the following questions.

- (1) Compute the mean (=expectation) of X . Compute also the expectation of X^2 .
- (2) Compute the average and variance of Y respectively.
- (3) Compute the covariance of X and Y .
- (4) Compute the correlation between X and Y .

Q3

Suppose the distribution function of X denoted as $F(x)$ is given by

$$F(x) = \begin{cases} 0 & \text{for } x \leq 1 \\ \frac{1}{2}(x - 1) & \text{for } 1 < x \leq 3 \\ 1 & \text{for } 3 < x \end{cases} .$$

In this case, answer the following questions.

- (1) Compute $E(X)$.
- (2) Compute $E(X^2)$.
- (3) For $j = 1, 2$, compute $E\left[\left(\frac{1}{x}\right)^j\right]$.