

Assignments #02 of
Econometrics I & Advanced Econometrics I (2013SY)

Instruction to students

1. Dead line for submission: May 8, 2013. Please submit your answer at the end of the class.
2. Use A4 size papers to answer.
3. The answer may be written in Japanese as well as English.

Q1.

Let (Ω, \mathcal{F}, P) be probability spaces and B be a set which satisfies $B \in \mathcal{F}$ and $P(B) > 0$. Show that $(B, \mathcal{F} \cap B, P(\cdot|B))$ is a probability space.

Q2.

Suppose that there is a disease which affects one out of 500 people. And also suppose there are two medical tests (A and B) for this disease with different reliabilities.

The medical test A can detect the disease properly with probability 0.95 if a person does have the disease. The test also can confirm it properly with probability 0.75 if a person does not have the disease .

The medical test B can detect the disease properly with probability 0.70 if a person does have the disease. The test also can confirm it properly with probability 0.90 if a person does not have the disease.

If a randomly selected person is subjected to these tests, and both tests indicate that the person has the disease, answer which test is more reliable for the person who actually has the disease with its reason.

Q3.

Suppose events A, B with $P(B) > 0$. Show that

$$P(A \cap B | A \cup B) \leq P(A \cap B | B).$$

Q4.

Let $A_1, A_2, \dots, A_n \in \mathcal{B}$ be independent events. Show the probability that any of A_1, \dots, A_n does not occur is less than or equal to

$$\exp\left(-\sum_{i=1}^n P(A_i)\right).$$