２０１９年度

慶應義塾大学大学院入試問題

経済学研究科（修士課程）

２０１８年９月６日 実施

科目名	Economics (English)	受験番号	Application number	氏名	Name

注意事項（Please note:）

1. This set of problems contains 8 pages (including the cover page).

2. There are seven problems from which you should choose two to answer. Each problem should be answered on a separate answer sheet. Please write the number of the problem you are answering on each answer sheet.

3. If you answer two or more problems on one answer sheet, only the first answer will be treated as a valid answer. Everything after the first answer will not be marked.

4. Answer in English.

5. Although the problem sheets will not be collected after the examination, please write your name and application number (受験番号, juken-bango) on the cover page.

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Problem 1. Answer all questions.

(1) Consider an economy with two individuals ($i=A, B$) and two goods ($j=1,2$). Each individual is a consumer and also a producer of the two goods. Each good is produced by using his/her own labor. Each individual is endowed with *10* units of labor. a_{ij} denotes the quantity of individual i's labor required to produce a unit of good j. The technology is described by the matrix

$$\begin{pmatrix} a_{A1} & a_{B1} \\ a_{A2} & a_{B2} \end{pmatrix} = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}.$$

The two goods are exchanged in a perfectly competitive market. The utility function of individual i is given by $U_i(X_{i1}, X_{i2}) = (X_{i1}X_{i2})^{1/2}$ where X_{ij} is the quantity of good j consumed by individual i.

(a) Calculate A and B's equilibrium productions of the two goods in a perfectly competitive market. Include the derivation process in your answer.

(b) Prove that the utility of each individual at this equilibrium is higher than that in the case where the two goods are not exchanged in the market.

(2) Consider Cournot competition among *3* firms in a homogeneous product market. The demand for the product is described by the demand curve with a constant price elasticity equal to *2*. All firms have identical cost functions with a constant unit cost equal to *5*. Calculate the product price in Cournot equilibrium. Include the derivation process in your answer.

(3) A risk neutral and monopolistic insurance company provides accident insurance to a risk averse customer. An accident occurs with the probability *0.2*. Without insurance, the customer's wealth is *100* if there is no accident, but *25* if there is an accident. The customer's von Neumann-Morgenstern utility of wealth W is given by $u(W) = W^{1/2}$. Thus the customer's expected utility is $0.8\times(100)^{1/2} + 0.2\times(25)^{1/2}$ in the absence of the insurance. Suppose an insurance contract which offers a payout of P in case there is an accident, and requires the customer to pay a premium of R. Consider a market where the monopolistic insurance company offers *(P, R)* and the customer decides to accept it or not. Find *(P, R)* at equilibrium and explain why this is an equilibrium.

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Problem 2.

Consider an economy that lasts forever. In each period (denoted by the subscript t), the single output of this economy (denoted by Y) is produced by the production function:

$$Y_t = AK_t^{\beta}L^{1-\beta} \qquad (0 < \beta < 1),$$

where A is a productivity parameter, K_t is the capital stock in period t, and L is a fixed number of labor force. The accumulation of capital is characterized by the following equation:

$$K_{t+1} = K_t + I_t - dK_t \qquad (0 < d < 1),$$

where I_t stands for investment and d is a parameter for capital depreciation. Finally, the investment level in each period is a constant fraction s of the output produced (the remainder is consumed by the workers):

$$I_t = sY_t \qquad (0 < s < 1).$$

We assume that the economy is endowed with some initial capital K_0 and this economy begins at $t = 0$.

(1) In this economy, the level of capital stock converges to a certain level called the steady state. Explain why.

(2) Solve for the level of output per worker in the steady state.

(3) Suppose now that the economy begins at a steady state. What happens to the steady state output per worker when s increases permanently? Also explain the change in its growth rate during transition from the old steady state to the new one.

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Problem3.

Answer the following three questions based on the methodology of Marxian economics.

(1) Briefly explain the following concepts.
①Commodities
②Money

(2)Explain the difference between individual value and social value.

(3) Discuss the characteristics of relative surplus value, while comparing it to absolute surplus value.

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Problem 4.

Consider a case where we have n sets of observations of three variables Y, X_1, X_2,

$$(Y_1, X_{11}, X_{12}), \dots, (Y_i, X_{i1}, X_{i2}), \dots, (Y_n, X_{n1}, X_{n2}).$$

(a) For the simple regression model using the variable X_1 as a regressor,

$$Y_i = \alpha_0 + \alpha_1 X_{i1} + e_i,$$

derive the least squares criterion Q for the coefficients α_0 *and* α_1, and the least squares estimators $\hat{\alpha}_0, \hat{\alpha}_1$ using the criterion Q.

(b) For the dataset we obtained, the sample mean and variance of Y are 50 and 25 respectively, those of X_1 are 100 and 100 respectively, while the sample covariance of Y and X_1 is 30.
Calculate the least square estimates of the two coefficients.

(c) Calculate the predictor of Y_i, $\hat{Y}_i$, and the residual $\hat{e}_i = Y_i - \hat{Y}_i$ using the least squares estimators above. Show that the correlation of $\hat{Y}_i$ and $\hat{e}_i$ is zero.

(d) Derive the expectation of the least squares estimator $\hat{\alpha}_1$ when X_1 and e are independent.

(e) Consider a multiple regression model using the variables X_1 and X_2 as the regressors,

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \varepsilon_i$$

where $\varepsilon_1, \dots, \varepsilon_i, \dots, \varepsilon_n$ are independently and identically distributed random variables with zero expectations. We also assume that $\varepsilon_1, \dots, \varepsilon_i, \dots, \varepsilon_n$ and $(X_{11}, X_{12}), \dots, (X_{i1}, X_{i2}), \dots, (X_{n1}, X_{n2})$ are mutually independent.
Under this setup, derive the predictor of $\hat{X}_{i1}$ and the residual $\hat{\delta}_i = X_{i1} - \hat{X}_{i1}$ when applying the single regression analysis of X_1 on X_2,

$$X_{i1} = \gamma_0 + \gamma_1 X_{i2} + \delta_i.$$

(f) Under the single regression analysis of Y_i on $\hat{\delta}_i$,

$$Y_i = \lambda_0 + \lambda_1 \hat{\delta}_i + \eta_i,$$

derive the least squares estimator of coefficient λ_1, $\hat{\lambda}_1$. Derive the expectation of $\hat{\lambda}_1$.
Provide the conditions for which the estimator $\hat{\lambda}_1$ and $\hat{\alpha}_1$ are equivalent.

(g) Derive the marginal effect of X_1 on Y, using the coefficients derived from the above multiple regression analysis.

Problem 5.

Answer one of A and B.

A

The benefits that many firms obtain by agglomerating in a limited geographic space (city) are called economies of agglomeration. Discuss why such economies of agglomeration occur, from the following three aspects: (1) sharing, (2) matching, and (3) learning.

B

Suppose that the price of healthcare services is given by P_1 yen, and an M-yen per P_1 subsidy on healthcare consumption is provided by the government (Strategy α).

1. Suppose that it was possible to offer an alternative subsidy scheme (Strategy β), where the government provides a lump-sum ex ante payment that is equal to the total amount of subsidy in Strategy α. Which is better for the consumer? Use indifference curves to explain your answer. Notice that the government spending is the same between Strategies α and β.
2. Next, consider a partial equilibrium of the healthcare market, this time with suppliers (i.e., hospitals and pharmaceuticals). Assume that the total amount of government spending is the same as in Strategy α. Discuss whether there is an alternative policy option that makes social welfare greater than in Strategy α.
3. Given your answers to questions 1 and 2 above, discuss why Strategy α is adopted in the majority of developed countries. (In Japan's case, such subsidies are paid in the form of reimbursements from the public health insurance system.)

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Problem 6.

Choose any region or country and discuss the role played by merchants in its industrial development. Make sure to use concrete historical facts and discuss from the perspective of economic history.

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Problem 7.

Choose and answer one of the following two questions. Answering both results in zero points.

(1) Provide concise theoretical summaries of classical economics, neo-classical economics, and Keynesian economics, respectively. Explain the criticisms offered by each school of thought against its predecessor.

(2) Explain concisely the relationship between the Enlightenment and the development of economics, taking into account the historical backgrounds.