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

注意事項（Please note:）

1. This set of questions contains 10 pages (including the cover page).

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

3. If you answer two or more questions 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 question sheets will not be collected after the examination, please write your name and examination number (受験番号, jyuken-bango) on the cover page.

Question 1. Answer only one of the following two questions; A and B. If you answer both, all answers for Question 1 become invalid.

A. Answer all questions in A-1 and A-2.

A-1. Consider a pure exchange economy with two goods (goods X and Y) and three consumers (consumers 1, 2, and 3). Utility functions of consumers are:

$$\begin{aligned}
u_1(x_1, y_1) &= (x_1)^{\frac{1}{2}}(y_1)^{\frac{1}{2}}, \\
u_2(x_2, y_2) &= (x_2)^{\frac{2}{3}}(y_2)^{\frac{1}{3}}, \\
u_3(x_3, y_3) &= (x_3)^{\frac{3}{4}}(y_3)^{\frac{1}{4}}.
\end{aligned}$$

Their endowments are:

$$(\bar{x}_1, \bar{y}_1) = (20, 60), \ (\bar{x}_2, \bar{y}_2) = (60, 90), \ (\bar{x}_3, \bar{y}_3) = (80, 40).$$

Let good Y be the numeraire.

(a) Given a price vector $(p, 1)$, derive each consumer's optimal consumption plan.

(b) Calculate the equilibrium price vector $(p^*, 1)$ and the final allocation $\left((x_1^*, y_1^*), (x_2^*, y_2^*), (x_3^*, y_3^*)\right)$ for the competitive equilibrium of this pure exchange economy.

A-2. There are four firms (firms 1, 2, 3, and 4) in an oligopolistic market for a homogeneous good. Firm i produces q_i units of the good. Assume that the inverse demand curve is

$$p = 850 - \frac{q_1 + q_2 + q_3 + q_4}{2}$$

Each firm's marginal cost is 50, and there is no fixed cost. Consider the following two scenarios:

Scenario I: All firms simultaneously and independently choose output levels.
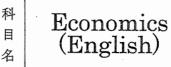
Scenario II: First, firm 1 chooses q_1; firm 2 sees the value of q_1 chosen by firm 1; then, firm 2 chooses q_2; firm 3 sees the values of q_1 and q_2 chosen by firms 1 and 2; then firm 3 chooses q_3; firm 4 sees the values of q_1, q_2, and q_3 chosen by firms 1, 2, and 3; then firm 4 chooses q_4.

(a) Calculate the Nash equilibrium of the simultaneous-move game associated with scenario I. Also, calculate firm 1's profit in the equilibrium.

(b) Calculate the subgame-perfect equilibrium of the sequential-move game associated with scenario II. Also, calculate firm 1's profit in the equilibrium.

(c) Which scenario is more competitive? Justify your answer.

B. Consider the Solow model given by equations $(1)-(4)$:

$$y = f(k) \tag{1}$$
$$c = (1-s)y \tag{2}$$
$$y = c + i \tag{3}$$
$$\Delta k = i - \delta k \tag{4}$$

y, k, c and i denote per capita output, capital, consumption and investment, respectively, and $s \in (0,1)$ and $\delta \in (0,1)$ are parameters that represent the rates of saving and capital depreciation. $f(k)$ satisfies the conditions $f(0) = 0, f'(k) > 0,$ and $f''(k) < 0,$ and Δk means a change in k. The population growth rate is assumed to be zero.

(a) Derive the steady-state conditions for all of the variables.

(b) When an initial level of capital is given by k_0, draw a graph describing how capital approaches toward the steady state.

(c) When the saving rate s is set to maximize the steady-state level of consumption, how is the steady-state level of capital determined? Use both a graph and equations to explain.

(d) Suppose that equation (1) is given by $y = \sqrt{k}$ and that $\delta = 0.1$. Then, solve for the saving rate s and the steady-state level of capital that maximize the steady-state level of consumption.

Question2.

Answer the following two questions on capitalism. Base your answer on the methodology of Marxian economics.

(1) Briefly explain the following concepts.
 ①Commodities
 ②Extra surplus-value
 ③Organic composition of capital
 ④Fictitious capital

(2) After the Plaza Accord in 1985, production bases of Japanese manufacturers began to move overseas rapidly. Moreover, in Japan, after the collapse of the bubble economy (beginning in the first half of 1990), prices for many goods began to be cut, a phenomenon known as "Price Slashing." The cutting of prices relied mainly on procurement from China and other emerging Asian countries. How can such a shift of production overseas and a decline in commodity price levels be explained? Briefly discuss in the context of the law of value (how commodity values are determined).

Question 3.

Consider a linear regression model: $Y_i = \beta_X X_i + \beta_Z Z_i + u_i$, $i = 1,\ldots, n$, where u_i is an i.i.d. random variable with $E(u_i) = 0$ and $\text{var}(u_i) = \sigma^2$ and independent of X_j and Z_j for $j = 1,\ldots, n$. Answer the questions (1) to (4). Write answers for (1) and (3), using

$$A_{XY} = \sum_{i=1}^n X_i Y_i, \quad A_{X^2} = \sum_{i=1}^n X_i^2, \quad A_{XZ} = \sum_{i=1}^n X_i Z_i, \quad A_{ZY} = \sum_{i=1}^n Z_i Y_i, \quad A_{Z^2} = \sum_{i=1}^n Z_i^2.$$

(1) Derive $\hat{\beta}_X$, the ordinary least square estimator for β_X.

(2) What is the expected value of $\hat{\beta}_X$?

(3) Derive the conditional variance of $\hat{\beta}_X$ conditional on X_i and Z_i, $i = 1,\ldots, n$.

(4) How will the value of the conditional variance derived in (3) change as the correlation between X_i and Z_i goes to 1.

Next, read the following and answer the questions (5) and (6).
Suppose that the true value of a 2×1 parameter vector $\theta = [\theta_1, \theta_2]'$ is given by $\theta_0 = [\theta_{01}, \theta_{02}]' = [3, 1]'$. Let $\hat{\theta} = [\hat{\theta}_1, \hat{\theta}_2]'$ be an estimator for θ. Suppose that

$$\sqrt{N}(\hat{\theta} - \theta_0) \to_d N(\mathbf{0}, \mathbf{V}), \quad \mathbf{V} = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix},$$

where "$\to_d$" denotes the convergence in distribution. Consider $\hat{\gamma} = \hat{\theta}_1^2 / \hat{\theta}_2$ as an estimator for $\gamma_0 = \theta_{01}^2 / \theta_{02}$.

(5) Derive the value of the asymptotic variance of $\sqrt{N}(\hat{\gamma} - \gamma_0)$.

(6) Now, suppose we mistakenly estimate γ_0 by $\hat{\gamma}^* = \hat{\theta}_1 / \hat{\theta}_2$ instead of $\hat{\gamma}$. Then it holds that

$$\sqrt{N}(\hat{\gamma}^* - \gamma_0 + \boxed{\text{A}}) \to_d N(0, \boxed{\text{B}}),$$

and the stochastic order of $\hat{\gamma}^*$ is $\hat{\gamma}^* = O_p(\boxed{\text{C}})$.

Fill in the appropriate numbers or expressions for A, B, and C.

Question 4.

Answer only one of A, B, and C. If you answer two or more, all answers to Question 4 become invalid.

A

Answer all of the following questions regarding dynamic poverty, using the concepts of "poverty line" and "permanent income".

(1) Briefly discuss the difference between persistent poverty and transient poverty.

(2) One possible cause for transient poverty is the existence of liquidity constraints. Explain intuitively the mechanism by which transient poverty occurs in this case.

(3) Another cause for transient poverty could be that the life cycle-permanent income hypothesis does not hold due to the positive value of precautionary saving. What is precautionary saving? Intuitively explain the mechanism by which transient poverty occurs in this case.

B

Answer all (1) - (3) below.

(1) Choose all of the correct statements out of the following five.

   (a) According to the trilemma of international finance, adopting a fixed exchange rate system requires sacrificing the freedom of international capital flows in addition to monetary policy autonomy.

   (b) According to the uncovered interest rate parity, currencies with relatively low interest rates are expected to depreciate.

   (c) The government expenditure multiplier is larger under a fixed exchange rate system than under a floating exchange rate system.

   (d) When relative purchasing power parity holds, absolute purchasing power parity also holds.

   (e) When relative purchasing power parity holds, the more Japan's price level declines, the more the yen's exchange rate appreciates.

(2) Suppose that Japan's two-year interest rate is 0% per annum, the U.S. two-year interest rate is 5% per annum, and the two-year forward exchange rate is 130 yen to the dollar. What is the yen-dollar exchange rate when the covered interest parity holds? Answer the nearest integer in yen per dollar.

(3) Suppose that U.S. foreign assets are $30 trillion, and foreign liabilities are $47 trillion. Also, suppose that 70% of foreign assets and 100% of foreign liabilities are denominated in U.S. dollars. Under these conditions, if all currencies other than the U.S. dollar depreciate by 30% relative to the U.S. dollar, by how much will the U.S. net foreign assets increase or decrease? Answer in trillions of dollars to the first decimal place, with a positive number for an increase and a negative number for a decrease.

C

Consider the environmental regulation for an economy consisting of two polluters $(i = A, B)$. The polluters emit a uniformly mixed pollutant (i.e., the damages from pollution do not depend on when and where they emit the pollutant). Their emissions levels in the absence of regulation are, respectively, $e_A = 100$, $e_B = 150$. Assume that the polluters are rational cost-minimizers with the following abatement cost functions:

$$C_A(q_A, \epsilon) = (10 + \epsilon)q_A + \frac{q_A^2}{2}$$

$$C_B(q_B, \epsilon) = (10 + \epsilon)q_B + \frac{q_B^2}{4}$$

where q_i is each polluter i's emissions abatement level, and ϵ is a stochastic error that varies at the industry level and is distributed as follows:

$$\epsilon = \begin{cases} 10, & Prob. = 0.5 \\ -10, & Prob. = 0.5 \end{cases}$$

Assume the social benefit from reducing the pollution is estimated as:

$$B(Q) = 50Q - \frac{Q^2}{6}$$

where Q is the total emissions abatement $Q = \sum_i q_i$. Answer the following questions.

（1）Suppose the regulatory authority adopts an emissions tax policy. Solve for the optimal tax level that maximizes the expected social welfare and the resulting expected social welfare at the *ex ante* optimum.

（2）Suppose, instead of the emissions tax, the regulatory authority adopts an emissions trading policy. The authority initially allocates emissions permits for free, with a uniform allocation rule. Solve for the optimal cap on total emissions that would maximize the expected social welfare and the resulting expected social welfare at the *ex ante* optimum.

（3）Use a diagram to illustrate the expected deadweight loss from each of the policies in (1) and (2). Make sure to label the axes properly.

（4）In real-world settings, the regulatory authority may use a *hybrid* emissions trading system in which it also sets the upper-limit price P_H and the lower-limit price P_L. Discuss why such a system may be preferred over policy (1) or (2) alone, using the diagram you drew in (3).

Question 5.

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

Question 6. Choose and answer one of the following two questions (if you answer both, all answers will be invalid):

1) Discuss the Marginal Revolution.

2) Discuss the reception of Western economics in Japan during the Meiji period.