Admission Examination for Shirai Seminar March 12, 2018

Microeconomics

I. Consider a following exchange economy in which there are two goods (X and Y) and two types of consumers (A and B). Each consumer is endowed with 10 units of goods X and 5 units of goods Y. Type A consumer's utility function is defined as

$$U^A(X_A, Y_A)=\log X_A + \log Y_A,$$

where X_A and Y_A are amount of goods X and Y consumed by type A consumer. Type B consumer's utility function is defined as

$$U^B(X_B, Y_B)=\log X_B + 2\log Y_B,$$

where X_B and Y_B are amount of goods X and Y consumed by consumer B. Consumers can exchange their goods in a competitive market in which p is the market price of goods X, i.e. one unit of goods X can be traded with p units of goods Y.

(a) What is the income (the value of endowed goods under price of goods X, p) and possible expenditure for each consumer? Write down a budget constraint for each consumer. (3 point)
(b) Define utility maximization problem for type A consumer. (2 point)
(c) Derive first order conditions for type A consumer. (3 points)
(d) Derive demand function of goods X for type A consumer. (3 points)
(e) Derive demand function of goods Y for type A consumer. (2 points)
(f) Answer questions (b) to (e) for type B consumer. (10 points)
(g) Suppose there is 1 consumer for each type in this exchange economy, i.e., there are two consumers in total. Write down the competitive market equilibrium condition. Solve for equilibrium price p and equilibrium consumption levels for each type of consumer. (5 points)
(h) Given the set up in (g) write down the definition of Pareto efficient resource allocation. (2 points)
(i) Derive the conditions that Pareto efficient allocation must satisfy under the set up in (g) (3 points)

(j) Draw box diagram and Pareto efficient resource allocation defined in (h) (2 points)

(k) Suppose there are 2 type A consumers and 3 type B consumers, i.e. there are 5 consumers in total. Define the competitive market equilibrium conditions under this set up. (2 points)

(l) Solve for the equilibrium price and equilibrium consumption levels for each type of consumer under the set up (j). (3 points)

Macroeconomics

II. Explain the role of fiscal and monetary policies in the stabilization of the business cycles. (10 points)

III. Give definition to each of the following concepts;

(a) Natural Rate of Unemployment (5 points)

(b) Solow Residual (5 points)

(c) Consumption Smoothing (5 points)

(d) Money Creation (5 points)

(a) The income is $10p+5$ and the expenditure is pX_i+Y_i, $i=\{A, B\}$. Thus a budget constraint for each consumer is $pX_i+Y_i \leq 10p+5$. (3 point)

(b) The utility maximization problem for type A consumer is

. (2 point)

(c) Derive first order conditions for type A consumer. (3 points)

(d) Derive demand function of goods X for type A consumer. (3 points)

(e) Derive demand function of goods Y for type A consumer. (2 points)

(f) Answer questions (b) to (e) for type B consumer. (10 points)

(g) Suppose there is 1 consumer for each type in this exchange economy, i.e., there are two consumers in total. Write down the competitive market equilibrium condition. Solve for equilibrium price p and equilibrium consumption levels for each type of consumer. (5 points)

(h) Given the set up in (g) write down the definition of Pareto efficient resource allocation. (2 points)

(i) Derive the conditions that Pareto efficient allocation must satisfy under the set up in (g) (3 points)

(j) Draw box diagram and Pareto efficient resource allocation defined in (h) (2 points)

(k) Suppose there are 2 type A consumers and 3 type B consumers, i.e. there are 5 consumers in total. Define the competitive market equilibrium conditions under this set up. (2 points)

(l) Solve for the equilibrium price and equilibrium consumption levels for each type of consumer under the set up (j). (3 points)