2940308 Microeconomic Theory II
Semester 2/2007
Practice Exam

1. Consider the following pure exchange economy with the utility function of A and B represented by:

$$U^A = x_1^A + x_2^A$$
$$U^B = \min\{x_1^B, x_2^B\}$$

Suppose that the initial endowment is (0,1) for A and (1,0) for B.
i) Find the pareto optimal allocation set.
ii) Find the Walrasian equilibrium.

2. Assume that in the market, there exist two types of worker, differentiated by their productivity. Type 1 workers have productivity of k =2 and the productivity of the type 2 workers is k =1. The cost of achieving a given level of education is higher for type 1 than type 2. The cost of e units of education for type 1 is $e/2$ and for type 2 is e. The education level has no influence on the productivity.
i) What would be the efficient education level if firms had the same information as workers as to the value of k?
ii) Suppose that worker's productivity is not observable by firms, but the level of education is observable (i.e. firms regard education as the signal of productivity), calculate the level of education that each type of agent will choose and the equilibrium wage. Suppose that the markets of labor and output are perfectly competitive and the price of output is \$1.
iii) Find the condition of education that makes it an effective signal of productivity, i.e. there is a cut off level education e^* such that if $e > e^*$, then workers are of type 1 and if $e < e^*$, then workers are of type 2.

3. Thailand is endowed with 200 units of labour. Its economy consists of producing rice and machinery. The production function of rice is described by $y_A = \sqrt{L_A}$ and the production function of machinery is $y_B = \sqrt{L_B}$ where y and L denote output and labour respectively and the subscript A denotes rice and B denotes machinery.
i) If Thailand does not trade with the rest of the world, find and graph the production possibilities frontier (PPF).
ii) If Thailand trades with the rest of the world and the term of trade is $\left[\frac{p_A}{p_B}\right] = 2$, how much rice and machinery will Thailand produce?
iii) Suppose that Thailand's representative consumer has a utility function in form of $U(y_A, y_B) = \sqrt{y_A y_B}$, will Thailand be a rice exporter?

4. A beekeeper locates next to an apple orchard. Both operate in the competitive environment. Let p_b and p_a be the price of honey and apple, and b and a are the amount of bee and apple respectively. The production function of honey is $H(b) = 5b$ while the cost of producing honey is $C_b(b) = \frac{\delta b^2}{2}$ where $\delta > 0$. The cost of the orchard owner is $C_a(a,b) = \frac{a^2}{2} - ab$.

i) What is the nature of externality?
ii) Show that if the two firms merge, the problem of externality is addressed.
iii) Show how the use of Pigouvian tax solves the problem of extermality

5. A village in remote area is populated with 200 residents. Each has an identical utility function of $U_i(X,G) = X_i + 10G - G^2$ where X is the amount of money an agent spends on private good and G is the amount of money spent on public good. Hence, the marginal cost of private and public good is 1.

i) What is the efficient condition of public good provision in this economy?
ii) From i), how much money, in total, will be spent on public good?

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