

Microeconomic Theory I

Final examination

Wednesday, December 20, 2006

Answer the following questions completely, clearly and concisely. You will be graded on how clearly you explain your answer as well on the content. Write the answers to Questions #1 and #2 in one blue book and the answers to Question #3 in another. Write the number of the questions, your name in BLOCK LETTERS, and your ID number on the front of each blue book. **Each question will receive equal weight.**

1. Consider an Edgeworth Box economy in which there are two agents, $i = 1, 2$ and two goods, $h = 1, 2$. Agents endowments are denoted by $e_i \in \mathbf{R}_+^2$, $i = 1, 2$ and their preferences are defined as follows: for any consumption bundles $x, y \in \mathbf{R}_+^2$, agent 1 strictly prefers y to x if and only if $y \gg x + (1, -1)$ and agent 2 strictly prefers y to x if and only if $y \gg x + (-2, 1)$. Define an equilibrium for this economy and prove that the equilibrium set is empty.

2. Suppose an Edgeworth Box economy has a strictly positive total endowment $(e, 2e)$ and the agents' preferences are represented by the utility functions $u_1(x_1) = \min\{x_{11}, x_{12}\}$ and $u_2(x_2) = \min\{x_{21}, x_{22}\}$. What is the set of Pareto-efficient allocations for this economy? Provide a proof to support your answer and illustrate it with a diagram.

3. Consider an economy in which there is one primary (non-produced) good and two produced goods. Call the primary good labor and label the produced goods $h = 1, 2$. There is a linear production technology, with two activities that can be operated at any scale. Activity 1, when operated at unit intensity, produces one unit of good 1 and requires as inputs 0.3 units of labor, 0.5 units of good 1 and 0.3 units of good 2. Activity 2, when operated at unit intensity, produces one unit of good 2 and requires as inputs 0.4 units of labor, 0.4 units of good 1 and 0.6 units of good 2.

There are two consumers in this economy. Each has an endowment of one unit of labor, which he supplies inelastically, and none of the produced goods. The consumers get utility from the produced goods, but not from leisure. Their preferences over bundles of produced goods are represented by the utility functions $u_1(x_1) = 2 \ln x_{11} + \ln x_{12}$ and $u_2(x_2) = \ln x_{21} + 2 \ln x_{22}$.

- (a) Define a competitive equilibrium for this economy.
- (b) Show that if the wage is $w^* = 1$ and the goods prices are $(p_1^*, p_2^*) = (3, 4)$, the equilibrium conditions for production are satisfied.
- (c) At the prices (w^*, p^*) given in (b), what are the consumption bundles demanded by the two consumers.
- (d) What are the intensities of the two activities needed to supply the net outputs determined in (c)? [Remember that the intensity of activity i equals the *gross* amount of good i produced.]
- (e) Check that the quantities you have found in (c) and (d), together with the prices (w^*, p^*) , constitute an equilibrium as defined in (a).