Economics 501B Midterm Exam
University of Arizona
Fall 2015

1. There are two goods in the economy, flowers and simoleans (quantities denoted by x and y, respectively). There are two consumers, Amy and Bev. Denote Amy's and Bev's consumption bundles by (x_A, y_A) and (x_B, y_B). Amy's and Bev's preferences are described by the utility functions $u_A(x_A, y_A) = 3x_A + y_A$ and $u_B(x_B, y_B) = x_B + y_B$. Amy owns 30 flowers but no simoleans; Bev owns 20 simoleans but no flowers.

(a) Determine all the Pareto efficient allocations and depict them in an Edgeworth box diagram. (You needn't derive the Pareto allocations from the definition, but indicate how you can tell from the marginal conditions for Pareto efficiency which allocations are the efficient ones and why the other ones aren't efficient.)

(b) The Second Welfare Theorem tells us that any Pareto allocation can be supported as a Walrasian equilibrium. In this economy, where neither consumer's preference is *strictly* quasiconcave, can any *non*-Pareto allocations be supported as Walrasian equilibria? Explain, and if any non-Pareto allocation can be supported, determine one of them.

(c) Determine all Walrasian equilibrium prices and allocations.

(d) Now assume that each consumer owns 15 flowers and 10 simoleans to begin with, and determine all Walrasian equilibria (if there are any).

2. Now suppose that Bev's preferences are as in Problem #1, and the initial endowments still total $(\mathring{x}, \mathring{y}) = (30, 20)$, but Amy's preferences are described by the utility function $u_A(x_A, y_A, x_B) = 3x_A + y_A + 10 \log x_B$: now Amy cares not only about her own consumption bundle but also about how many flowers Bev has.

(a) Write down a parametric family of maximization problems whose solutions are the Pareto allocations. Then derive the first-order conditions that characterize the solutions, and use the first-order conditions to determine all the interior Pareto allocations (the ones in which each person receives a positive amount of each good), if there are any. Depict the Pareto allocations in an Edgeworth box diagram.

(b) If Amy owns all 30 of the flowers and Bev owns all 20 of the simoleans, determine all the Walrasian equilibria.

3. There are two goods, with quantities denoted by x and y. The total amounts available to Ann and Bob together are $\mathring{x}$ and $\mathring{y}$, and these quantities satisfy $\mathring{x} = \mathring{y}$. Ann's preferences are given by the utility function $u_A(x, y) = \sqrt{x} + \sqrt{y}$ and Bob's preferences are given by the utility function $u_B(x, y) = \min\{x, y\}$.

(a) Determine the set of Pareto allocations.

(b) Derive the utility frontier for Ann and Bob, and depict the frontier in a diagram for the case $\mathring{x} = \mathring{y} = 16$.

(c) What allocation(s) maximize the social welfare function

$$W(x_A, y_A, x_B, y_B) = u_A(x_A, y_A) + u_B(x_B, y_B)?$$

For parts (d) and (e) assume that Ann initially owns the bundle $(\mathring{x}_A, \mathring{y}_A) = (9, 4)$ and Bob initially owns the bundle $(\mathring{x}_B, \mathring{y}_B) = (7, 12)$.

(d) Determine all the Walrasian equilibria.

(e) Determine the set of core allocations. Depict the core and the set of Pareto allocations in an Edgeworth box diagram.