

EconS 503 - Microeconomic Theory II
Homework #1 - Due date: Friday, January 24th, in class.

1. **Exercises from Munoz-Garcia (2017):**

(a) Chapter 6: Exercises 14 and 22.

2. **Testing the first and second welfare theorems.** Consider two neighbors that trade food from their gardens (f) and groceries (g). Neighbor A has utility function $u^A(f^A, g^A) = \ln f^A + 2 \ln g^A$ and neighbor B has utility function $u^B(f^B, g^B) = 2 \ln f^B + \ln g^B$. Assume that each neighbor has 40 units of food and 25 units of groceries.

(a) Find the WEA.

(b) Find the set of PEAs.

(c) Is the WEA part of the set of PEAs? Does your result satisfy or violate the first welfare theorem?

(d) Propose an allocation which, being one of the PEAs found in part (b), is different from the WEA found in part (a). How could this allocation be implemented by a social planner? Relate your results with the second welfare theorem.

3. **Stone-Geary utility function in pure exchange economy.** Consider a pure exchange economy with two individuals, A and B , whose utility functions are

$$\begin{aligned}u^A(x_1^A, x_2^A) &= (x_1^A - b_1)^{\frac{1}{2}} (x_2^A - b_2)^{\frac{1}{2}} \\u^B(x_1^B, x_2^B) &= x_1^B x_2^B\end{aligned}$$

where $b_1, b_2 > 0$ represent the minimal amounts of goods 1 and 2 that individual A must consume in order to remain alive (such as water and shelter). Individuals A and B have endowments of $\omega^A = (\omega_1^A, \omega_2^A) = (4, 2)$ and $\omega^B = (\omega_1^B, \omega_2^B) = (2, 4)$, respectively.

(a) Set up the Lagrangian and find the individuals' Walrasian demand functions.

(b) Find the set of PEAs. (*Hint:* Your answer should be in terms of b_1 and b_2).

(c) Find the WEA. (*Hint:* Your answer should be in terms of b_1 and b_2).

(d) Evaluate the contract curve and WEA at the following three different subsistence levels: (i) $(b_1, b_2) = (4, 2)$, (ii) $(b_1, b_2) = (3, 3)$, and (iii) $(b_1, b_2) = (2, 4)$. In which case(s) is individual A unable to survive?