

# MICROECONOMIC ANALYSIS

ECON 8001-2

Fall 2009

Instructor: Terry Hurley

Due: 9-22-08

TA: Giovanni Alarcon

## HOMEWORK #2

*Note: When writing up your answers, carefully define all new notation and terms that you introduce, and write in complete sentences and paragraphs.*

1. Define the choice set  $\mathbf{B} = (\{x_1, x_2\}, \{x_1, x_3\}, \{x_2, x_3\}, \{x_1, x_2, x_4\})$  and define a rule

$$C(b) = \begin{cases} \{x_2\}, & \text{for } \{x_1, x_2\} \\ \{x_3\}, & \text{for } \{x_1, x_3\} \\ \{x_3\}, & \text{for } \{x_2, x_3\} \\ \{x_2, x_4\}, & \text{for } \{x_1, x_2, x_4\} \end{cases}.$$

Use this choice rule to define the set of revealed preference relations for the different sets of alternatives in  $\mathbf{B}$ . Taken together, is this revealed preference relation consistent with a rational preference relation defined on  $\{x_1, x_2, x_3, x_4\}$ ? Explain.

2. Consider the complete preference relation  $\underline{f}$  defined by  $z' \underline{f} z''$  if and only if  $\min \{z_1', z_2'\} \geq \min \{z_1'', z_2''\}$  for all  $z', z'' \in \mathfrak{R}_+^2$  (e.g.  $z_l \geq 0$  for  $l = 1, 2$ ).
- (a) Illustrate the indifference contour sets,  $\text{ICS}(z)$ , for this preference relation.
  - (b) Prove that this preference relation is monotone, convex, and transitive.
  - (c) Is the preference relation strictly monotone and strictly convex? Explain.
  - (d) What are the economic implications of this preference relation?
3. Suppose  $u(\cdot)$  is a continuous utility function representing a strongly monotone, continuous, and rational preference relation  $\underline{f}$  on  $X = \mathfrak{R}_+^L$ . Prove that the Marshallian demand correspondence  $x(p, w)$  satisfies *Walras Law*:  $p \cdot x = w$  for all  $x \in x(p, w)$ .

4. In the classical consumer problem, consumption is constrained only by income and prices. That is, consumer can consume as much as they want of a particular good, provided their total expenditures do not exceed their income. However, there are lots of examples where a consumer's choices are constrained by more than just income. For example, the U.S. Food Stamp Program provides income in the form of Food Stamps to low income individuals, but restricts what these individuals can spend this income on.

Consider a two commodity world,  $x = (x_1, x_2) \in \mathfrak{R}_+^2$ , with prices  $p = (p_1, p_2) \in \mathfrak{R}_{++}^2$  (e.g.  $p_l > 0$  for  $l = 1, 2$ ). Assume the individual has income  $w > 0$  from working which can be spent freely on either commodity. Additionally, the individual receives income  $w_{FS} > 0$  from the government which can only be spent on commodity  $x_2$ .

- Describe the budget set for this individual,  $B_{p, w, w_{FS}}$ , mathematically and illustrate it in a figure.
- Prove that this budget set is convex.
- Prove that for  $w' > w''$ ,  $B_{p, w'', w_{FS}} \subset B_{p, w', w_{FS}}$ . What is the economic implication of this result?
- Suppose the individual's preference relation is strictly convex, locally nonsatiated, continuous, and rational. Can we guarantee demand will be a unique? Explain.
- Again, suppose an individual's preference relation is strictly convex, locally nonsatiated, continuous, and rational. Will *Walras Law* hold? Explain.