

Micro I Midterm, February 26, 2008

You have until 6:15 to complete this exam. Answer all four questions. You may use results you recall from class, the textbook, or your homework to answer the questions. To insure maximum credit, be sure to explain your answers. Each question is worth 25 points, for a total of 100 points. The questions are not equally hard. Good luck!

1. Suppose the expenditure function is $e(\mathbf{p}, \bar{u}) = p_1 + \sqrt{p_1 p_2} + \bar{u}(p_1 + p_2)$ for $\bar{u} \geq 0$.

- a) Find the Hicksian demand functions.
- b) Find the indirect utility function.

2. Suppose preferences on $\mathfrak{X} = \mathbb{R}_+^2$ are described by the utility function

$$u(x_1, x_2) = \begin{cases} x_1 + x_2 & \text{if } x_1 > 0 \\ 0 & \text{if } x_1 = 0. \end{cases}$$

- a) Are these preferences convex?
 - b) Are these preferences separable relative to the partition $\mathcal{P} = \{\{1\}, \{2\}\}$?
 - c) For what prices $\mathbf{p} \gg \mathbf{0}$ and incomes $m > 0$ does the consumer's problem have a solution?
3. There are two consumers. Consumer 1 has utility $u_1(x_1, x_2) = x_1^{3/4} x_2^{1/4}$ and wealth $m_1 > 0$. Consumer 2 has utility $u_2(x_1, x_2) = x_1^{1/4} x_2^{3/4}$ and wealth $m_2 > 0$.

- a) Find the individual demand functions $\mathbf{x}^i(\mathbf{p}, m_i)$.
- b) Find aggregate demand $\sum_{i=1}^2 \mathbf{x}^i(\mathbf{p}, m_i)$.
- c) Either show that aggregate demand can be written as a function of \mathbf{p} and $m = m_1 + m_2$ or provide an example to show it cannot be done.
- d) Suppose $m_1 = m/3$ and $m_2 = 2m/3$. Does aggregate demand obey the Law of Demand?

4. A firm has production set $Y = \{\mathbf{y} \in \mathbb{R}^3 : y_1, y_2 \leq 0, y_1 + y_3 - \sqrt{-y_2} \leq 0\}$.

- a) Does the technology obey constant returns to scale?
- b) Find the supply (net output) function $\mathbf{y}(\mathbf{p})$.
- c) Find the profit function $\pi(\mathbf{p})$.