

Midterm Exam

Yuan Zi

EI037 Microeconomics

This is a closed book exam. You need to solve this exam alone and independently. Your answers should be legible, clear, and concise. In order to get full credit you have to give complete answers, including how answers are derived. Partial answers will lead to partial credit. Wrong additional statements (i.e., guessing) might reduce the given credit.

You have 2 hours to complete this exam. Each sub-question is worth 0.5 points, adding up to a total of 6 points. Allocate your time wisely across questions. Good luck!

1. Consumer Choice and Preferences

1.a. Explain in words or graphs the concept of the *weak axiom of revealed preference* (WA). Provide an example of when the WA is violated.

1.b. Explain in graphs the concept of the *compensated law of demand* (CLD). Provide an example of when the CLD is violated.

1.c. The preference relation \succeq defined on the consumption set $X = \mathbf{R}_+^L$ is said to be *monotone* if $x \gg y$ implies that $x \succ y$; and *strongly monotone* if $x > y$ implies that $x \succ y$. Show that if \succeq is strongly monotone, then it is monotone.

1.d. The preference relation \succeq defined on the consumption set $X = \mathbf{R}_+^L$ is said to be *weakly monotone* if and only if $x \geq y$ implies that $x \succeq y$. Show that if \succeq is transitive, locally non-satiated, and weakly monotone, then it is monotone.

2. Classical Demand Theory

Consider the following utility function

$$u(x) = x_1 + 2x_2^{\frac{1}{2}}$$

2.a. Find the Walrasian demand function for goods 1 and 2 as a function of prices and wealth.

2.b. Find the Hicksian (compensated) demand function $h(p, u)$ for goods 1 and 2.

2.c. Find the expenditure function $e(p, u)$, and verify Shephard's lemma.

2.d. Find the indirect utility function $v(p, w)$, and verify Roy's identity.

3. Welfare Economics

Consider an economy with two goods, 1 and 2. Consider a price change from the initial price vector p^0 to a new price vector $p^1 \leq p^0$.

- 3.a. Write the mathematical definition of the *equivalent variation* (EV). Explain the concept using both words and graphs.
- 3.b. Write the mathematical definition of the *compensating variation* (CV). Explain the concept using both words and graphs.
- 3.c. Show that if $u(x) = x_1 + 2x_2^{\frac{1}{2}}$, then $CV(p^0, p^1, w) = EV(p^0, p^1, w)$ for any (p^0, p^1, w) . (*Hint: you can choose p_1 as the numéraire – i.e., fix $p_1 = 1$.*)
- 3.d. Explain the intuition behind the results of 3.c. In this case, what is the shadow price of money?