Questions for Quiz 1
ECON6001/ECON6701, Semester 1 2022

INSTRUCTIONS

1. Unlike the usual MCQ you may be accustomed to, in the following questions, there is not necessarily a unique correct choice – multiple options *may* be correct. For questions with multiple correct answers, total points for a question are divided equally between each correct selection. I deduct points if you are *over-selecting* answers. For example: To illustrate, suppose (a) and (b) are the only *two* correct answers to a 10 point question.

your choice	mark	Explanation
a,b	10	Full mark
a,b,c	5	(5 deducted for choosing (c), since)
		you choose *three* options when only two are correct
a,d	5	no deduction for choosing the incorrect (d),
		since only *two* options are chosen

2. This Quiz is testing you on how well you understand the material covered in Lec 1-3. Review these lectures well, make sure that you understand what all the Theorems are saying and the assumptions they rely upon. Work through the Problem Sets. In particular, Condition α, Condition β, WARP, Roy's Identity, Sheppard's Lemma, properties of the Slutsky Matrix (second last slide, Lec 3) all play a role.

   For the most part, there are no complicated derivations, often simple examples / counter-examples to the given statements are adequate.

3. Each of the TEN questions is worth 10 points.

QUESTIONS.

Note. There was a typo in the definition of WARP in the original slides, which I then corrected in class. (Slide 23, Lec 1) For convenience, I repeat the corrected definition here: *WARP is said to hold if for any given pair of alternatives a, b: a is revealed preferred to b implies b is <u>not</u> strictly revealed preferred to a.*

1) DM has a well-defined strict ranking over the finite set of alternatives $X = \{a, b, c, d, e, f, g\}$. Without loss of generality, assume $a \succ b \succ c \succ d \succ e \succ f \succ g$. At any $B \subseteq X$, $C(B)$ is the median ranked alternative. Median is defined as the middle ranked element if B has an odd number of elements and the "middle two" elements if B has an even number of elements. (So, for example, $C(\{a, b, c\}) = \{b\}$ since $a \succ b \succ c$ and $C(\{c, d, f, g\}) = \{d, f\}$ since $c \succ d \succ f \succ g$.)

   a) Condition α is satisfied.

   b) Condition β is satisfied.

   c) Not enough information to conclude if Condition β holds.

   d) None of the above.

2) In a two good economy, a consumer chose the bundle A when given the blue budget constraint (the relatively steep line) and B when given the brown budget constraint. Assume that choice in each case is unique. What property/condition/axiom does she necessarily violate? **You will be able to write your answer directly on Canvas**

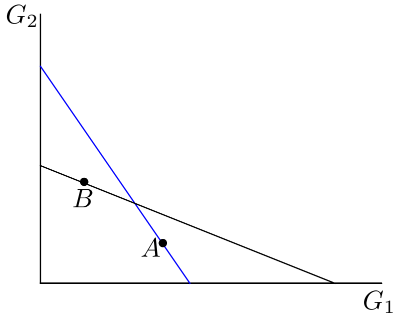

Figure 1.

3) Consider a choice structure $\langle X, \mathcal{B}, C\rangle$ where X is finite and $\mathcal{B}$ includes all two and three element subsets of X. Which of the following are true statements?

a. Condition α and Condition β imply the WARP .

b. Condition α and Condition β are implied by the WARP.

c. Condition α implies Condition β, provided $C(B)$ has exactly one element for every $B \in \mathcal{B}$.

d. A preference relation (complete, reflexive and transitive relation) $\succeq$ that rationalizes the agent's choice may not exist even though the Weak Axiom is satisfied.

4) Fill in the blanks labelled "**A**" , "**B**" and "**C**" and "**D**" in the statement below. You will be able to enter your answer directly on Canvas Quiz portal.

____**A**____ Theorem ensures that ____**B**____ preferences on $\mathbb{R}^n_+$ have such a utility representation which allows us to apply ____**C**____ Theorem to gaurantee the existence of a solution to the Utility Maximization Problem for any feasible set is ____**D**____.

5) Let $X = \{x, y, z\}$ and $\mathcal{B} = \{\{x, y\}, \{x, y, z\}\}$ and $C(\{x, y\}) = \{x\}$. Which of the following are consistent with WARP?

a. $C(\{x, y, z\}) = \{y\}$

b. $C(\{x, y, z\}) = \{x\}$

c. $C(\{x, y, z\}) = \{z\}$

d. $C(\{x, y, z\}) = \{x, z\}$

6) We used ______**A**______ to connect preferences with observable demand and then made an assumption that preferences are ______**B**______ to deduce that the area under the curve shown in Figure 2 below is a measure of a consumer's utility when price of the good changes .

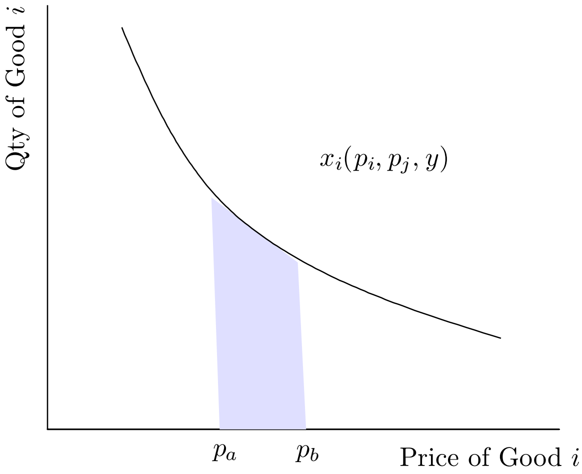

Figure 2. Marshallian Demand for Good i.

7) Consider a typical utility maximizing consumer, with a continuous utility function defined over two goods. So $X = \mathbb{R}^2_+$ as usual but with a small twist on the budget sets:

The cost of a unit of Good 1 consumed *above* 50 units is *one and a half times the cost* of a unit that good consumed up to 50 units. So depending on the income level, a typical "budget line" may look either the thick blue line or the thick black line, depending on whether the consumer has sufficient income to consume 50 units or not.

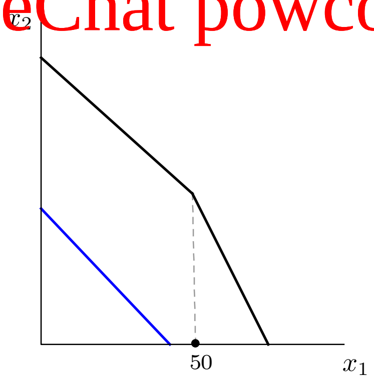

Figure 3.

Assume that Assumption 3 on preferences is met (so, in particular, there is a continuous utility function). Which of the following statements are true?

a. The "Extreme Value Theorem" ensures that the utility maximization problem has a well-defined solution for all $(\boldsymbol{p}, y) \gg 0$.

b. For every $(\boldsymbol{p}, y) \gg 0$, there must be a *unique* utility maximizing choice.

c. Part (b) but only if preferences are also strictly convex and locally non-satiated.

d. Since the budget sets are not convex, "Extreme Value Theorem" does not apply here.

8) Repeat the previous question, but this time assume that "Every unit of Good 1 consumed *above* 50 units costs ~~*one and a half times the cost*~~ **half the cost** a unit of consumption consumed up to 50 units". Using a figure of the appropriate budget sets, answer which of the folowing of the following statements are true .

a. The "Extreme Value Theorem" ensures that the utility maximization problem has a well-defined solution for all $(\boldsymbol{p}, y) \gg 0$.

b. For every $(\boldsymbol{p}, y) \gg 0$, there must be a *unique* utility maximizing choice.

c. Part (b) but only if preferences are also strictly convex and locally non-satiated.

d. Since the budget sets are not convex, "Extreme Value Theorem" does not apply here.

9) The following is a Slutsky Matrix for some rational consumer in a three good economy at some given (and fixed) $(\boldsymbol{p}, u)$:

$$S = \begin{pmatrix} -8 & a & b \\ c & -2 & d \\ 3 & e & f \end{pmatrix}$$

Using the properties of the Slutsky Matrix, we may conclude that

a. $b = a$ and $d = e$.

b. $a = c$.

c. ac ≤ 16

d. None of the above.

10) Suppose the expenditure function is given by the following equation:

$$e(\boldsymbol{p}, u) = \left(\frac{1}{3}p_1 + \sqrt{p_1 p_2} + \frac{2}{3}p_2\right)u$$

At a target utility of $u = 1$, which of the following statements are true, where x^h is the Hicksian demand function?

a. $x_1^h(\boldsymbol{p}, u) > \frac{1}{3}$ and $x_2^h(\boldsymbol{p}, u) > \frac{2}{3}$

b. $x_1^h(\boldsymbol{p}, u) \leq \frac{1}{3}$ and $x_2^h(\boldsymbol{p}, u) \leq \frac{2}{3}$

c. $x_1(\boldsymbol{p}, u) = \frac{1}{3}$ and $x_2(\boldsymbol{p}, u) = \frac{2}{3}$

d. None of the above.

Hint: What Lemma connects Expenditure function with the Hicksian Demand? See Lec 3.