

Midterm Exam (90 mins)

Mobile phones, class notes and problem sets are strictly prohibited.

Exercise 1 Consider a consumer with consumption set \mathbb{R}_+^2 .

1. Give examples of possible (i) Leontieff, (ii) Cobb-Douglas and (iii) Linear utilities for this consumer (you are free to choose the value of the parameters)
2. For each of the utility function considered in 1., provide a graphical representation of the indifference curve corresponding to a utility level of 1.

Exercise 2 Consider a consumer with consumption set \mathbb{R}_+^3 and a Cobb-Douglas utility function of the form

$$u(x_1, x_2, x_3) = x_1^{0.2} x_2^{0.5} x_3^{0.3}$$

1. Determine the demand function of this consumer.
2. Would the demand of the consumer for good 1 be affected by a rise in the price of good 2 ?
3. Would the indirect utility¹ of the consumer be affected by a rise in the price of good 2 ?
4. Would the demand of the consumer be affected by an inflation rate of 1% that affect all prices and income ?

Exercise 3 Consider a consumer with consumption set \mathbb{R}_+^2 whose demand function d satisfies Walras law and whose demand for good 1 is given by

$$d_1(p, w) = \frac{w}{(p_1 + p_2)}$$

1. Determine the demand of the consumer for good 2
2. State the WARP in the framework of the demand.
3. Show that d satisfies WARP.

¹i.e. the utility obtained at the demand

Exercise 4 We consider three agents: Alice, Bob and Lucy that face three alternatives: $\{A, B, C\}$.

- Alice prefers (strictly) A to B to C
- Bob prefers (strictly) B to C to A
- Lucy prefers (strictly) C to A to B

1. Show that each of these preferences can be represented by a utility function.
2. Are the preferences of each agent rational ?

Alice, Bob and Lucy now face the three following choice situation $\{\{A, B\}, \{B, C\}, \{C, A\}\}$. They decide to use as collective choice rule majority voting, i.e. the alternative that is preferred by the majority is chosen. We denote this collective rule by c .

- 3 Determine the choice made collectively in each of the situation
- 4 Does the choice structure (\mathcal{B}, c) satisfy WARP ?
- 5 Does there exist a preference relation that rationalizes c ?