National University of Lesotho

MSc examinations

EC6301 – Advanced Microeconomics I

January 2023   **100 Marks**   **3 Hours**

INSTRUCTION: Answer **question one** and **any other two** questions.

Question 1

Jeff likes both avocados and biscuits. The consumption bundle where Jeff consumes x_A (avocados) and x_B (biscuits) is written as (x_A, x_B). You are given the following information

$$(10, 10) \sim (20, 5) \quad \text{and} \quad (9, 16) \sim (12, 12)$$

We also know that Jeff's preferences are complete, transitive, continuous and strictly monotonic.

a) Discuss and show which of the following statements are true (if you have insufficient information state so):

     i. $(20, 5) \succsim (9, 16)$ **[5]**
     ii. $(9, 16) \succ (18, 4)$ **[5]**
     iii. $(20, 5) \prec (9, 15)$ **[5]**

b) You are now told that the set of consumption bundles $(x_A, x_B) \in \mathbb{R}^2_+$ which are on the same indifference curve as $(20, 5)$ satisfy $x_B = 100/x_A$. Show that the set $\succsim (20, 5)$ is defined by the relationship $x_B \geq 100/x_A$. Does this information affect your previous conclusions?

                                                                         [20]

c) Discuss and show whether the set $\succsim (20, 5)$ is:

     i.   Closed   **[5]**

     ii.   Convex   **[10]**

Question 2

Assume a Bertrand duopoly with market demand $Q = \alpha - \beta p$ in which firms have no fixed costs and identical marginal cost. Find a Bertrand equilibrium pair of prices , (p_1, p_2), and quantities, (q_1, q_2), when the following hold.

a) Firm 1 has fixed costs $F > 0$.   **[7]**

b) Both firms have fixed costs $F > 0$.   **[9]**

c) Fixed costs are zero, but firm 1 has lower marginal cost than firm 2, so $c_2 > c_1 > 0$ (For this one assume the low-cost firm captures the entire market demand whenever the firms charge equal prices).   **[9]**

Question 3

In an economy with two types of consumers, each type has the respective utility function and endowments:

$$u^1(x_1, x_2) = x_1 x_2 \text{ and } e^1 = (8,2)$$
$$u^2(x_1, x_2) = x_1 x_2 \text{ and } e^2 = (2,8)$$

a) Draw an Edgeworth box for this economy when there is one consumer of each type.

[5]

b) Characterise as precisely as possible the set of allocations that are in the core of this two-consumer economy. **[7]**

c) Show that the allocation giving $x^{11} = (4,4)$ and $x^{21} = (6,6)$ is in the core. **[3]**

d) Now replicate this economy once so that there are two consumers of each type, for a total of four consumers in the economy. Show that the double copy of the previous allocation, giving $x^{11} = x^{12} = (4,4)$ and $x^{21} = x^{22} = (6,6)$ is not in the core of the replicated economy. **[10]**

Question 4

Consider the CES technology $f(x_1, x_2) = \left(x_1^\rho + x_2^\rho\right)^{\frac{1}{\rho}}$.

a) What is the elasticity of substitution of this technology? **[5]**

b) Derive the cost function for this technology? **[10]**

c) Verify, by using whatever duality results you think appropriate, that this cost function does indeed give rise to the underlying technology you began with. **[10]**