Microeconomics 1 Exam - December 10th, 2021

Erasmus Mundus Joint Master Degree (EMJMD) - QEM1 (First Year) - 2021/2022

Please solve all exercises below. **Motivate all your answers**. You have **1 hour 45 minutes** to provide your solutions. The exam is closed book and closed notes.

Exercise 1 (30 minutes)
Consider an expected-utility decision maker with utility of the form $u(x) = \log x$.

(a) Let X be a lottery with equally likely outcomes $(1, 2, 4, 8)$. Give the definition of certainty equivalent and compute it for X.

(b) Let Y_π be a lottery whose outcome is 1 with probability π and 8 with probability $1-\pi$. Determine the value π^* for which the decision maker is indifferent between X and Y_{π^*}.

(c) If $\pi > \pi^*$ which lottery between X and Y_π is preferred by the decision maker? Why?

(d) Assume that a third lottery is available, lottery Z with equally likely outcomes $(2, 4, 8)$, and that the decision maker can chose between the combinations $\frac{1}{2}X + \frac{1}{2}Z$ and $\frac{1}{2}Y_{\pi^*} + \frac{1}{2}Z$. Which combination is preferred? Why? (no computation is needed)

(e) Compute the absolute risk aversion of the decision maker.

Exercise 2 (30 minutes)
A firm produces a single output with one input $z \geq 0$. The production function $f(z)$ is:

$$f(z) = \begin{cases} \alpha & \text{if } z \geq 1 \\ \alpha z^2 & \text{if } 1 \geq z \geq 0 \end{cases}$$

with $\alpha > 0$.

(a) Determine and draw the production set Y defined by the production function. Check if the production set satisfy the property of *inaction* and explain the significance and the implication of the property of *inaction*.

(b) Define the profit of the firm and without solving analytically the firm's profit maximization problem determine graphically whether or when the firm's profit is: *i)* positive and finite; *ii)* 0; *iii)* $+\infty$ (infinite). Motivate your answer.

(c) For a generic output level greater than zero and less than α, compute the conditional demand factor of the firm and the firm's cost function.

Exercise 3 (45 minutes)
Consider an exchange economy with two consumers and two goods. Consumer 1 has consumption set $\mathbb{R}^2_+$, endowment $\omega_1 = (2, 1)$ and utility $u_1(x_{11}, x_{21}) = (x_{11})^{\frac{2}{3}}(x_{21})^{\frac{1}{3}}$. Consumer 2 has consumption set $\mathbb{R}^2_+$, endowment $\omega_2 = (0, 3)$ and utility $u_2(x_{12}, x_{12}) = x_{12}x_{22}$.

(a) Represent in the Edgeworth box the endowment, the indifference curves going through the initial endowment for both agents, and the set B of allocations which Pareto dominate the initial endowments.

(b) Give the definition of a Pareto optimal allocation for this economy, determine the set P of Pareto optimal allocation, and provide a graphical representation.

(c) Give the definition of a general equilibrium for this economy, find the set of competitive equilibria, and provide a graphical representation.

(d) Can the allocation where the two agents consume the same bundle be supported as a competitive equilibrium? Why? If so, specify for which prices, find the transfer in good 1 that makes it possible, and provide a graphical representation.

(e) Can an allocation where the two agents consume the same quantity of the first good be supported as a competitive equilibrium? Why? If so, specify which allocation and for which prices, find the transfer in good 1 that makes it possible, and provide a graphical representation.