

FINAL EXAM of MICROECONOMICS 1 (1 hour and 45 minutes) – Master QEM

Mobile phones, class notes and problem sets are strictly prohibited

Read and think before you write, and try to be both concise and precise

Exercise 1 (30 minutes). We consider an expected-utility decision-maker with utility of the form $u(x) = x^a$ with $a < 1$

- 1) Let X be a lottery whose outcome is uniformly distributed over $[0, 1]$. Determine $\mathbb{E}(u(X))$
- 2) Let Y be a lottery whose outcome is 0 with probability $1/3$ and 1 with probability $2/3$. Determine $\mathbb{E}(u(Y))$
- 3) Determine the value a^* (of a) for which the decision-maker is indifferent between X and Y
- 4) If $a > a^*$, which lottery, X or Y , is preferred by the decision-maker ?
- 5) Determine, as a function of a , the coefficient of absolute risk-aversion of the decision-maker.

Exercise 2 (30 minutes). We consider a setting with two commodities and two firms. Both firms produce commodity 2 using commodity 1 as input. The technology of firm 1 is represented by the production function $f_1(y) = 2\sqrt{y}$. The technology of firm 2 is represented by the production function $f_2(y) = y$.

In the following, the price of good 1 is assumed normalized to 1 and the price of good 2 is denoted by $p \in \mathbb{R}_+$

- 1) Assuming free-disposal, give the production set of firm 1 and its supply as a function of p .
- 2) Assuming free-disposal, give the production set of firm 2 and its supply as a function of p .

Assume firms 1 and 2 merge, so that the production function of the merged firm is

$$g(y) = \max_{z \in [0, y]} f_1(z) + f_2(y - z)$$

- 3) Show that if the merged firm has less than one unit of input, it only uses the first technology.
- 4) Determine which combination of technologies, the merged firm uses if it has $k \geq 2$ units of output.
- 5) Determine the supply function of the merged firm.

Exercise 3 (45 minutes). We consider an exchange economy with two consumers and two goods.

- Consumer 1 has consumption set \mathbb{R}_+^2 , initial endowment $e_1 = (1, 1)$ and utility

$$u_1(x_{11}, x_{12}) = x_{11}^{1/3} (x_{12})^{2/3}$$

- Consumer 2 has consumption set \mathbb{R}_+^2 , initial endowment $e_2 = (1, 3)$ and utility

$$u_2(x_{21}, x_{22}) = x_{21}^{1/2} x_{22}^{1/2}$$

- 1) Represent in the Edgeworth box the initial endowment and the indifference curves going through the initial endowment for both agents.

- 2) Represent in the Edgeworth box the set B of allocations that are better, in the sense of Pareto, than the initial endowments.
- 3) Give the definition of a Pareto Optimum for this economy.
- 4) Determine the set C of Pareto Optima of the economy.
- 5) Represent (approximately) the set C in the Edgeworth box. Do B and C coincide ? Explain why/not ?
- 6) Give the definition of a general equilibrium for this economy.
- 7) Determine the general equilibrium of this economy (normalize to 1 the price of commodity 2).