Université Paris 1 Panthéon–Sorbonne - **December 11, 2019**

FINAL EXAM of MICROECONOMICS 1A (1 hour) – DU MMEF

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 (35 minutes). We consider an expected-utility decision-maker facing the following possible professional occupations: working in the financial industry (A), working in the movie industry (B), working in the car industry (C). We further assume that the decision-maker can apply to three different schools.

- After School 1, he is certain to find a job in the car industry.
- After School 2, he is certain to find a job in the financial industry.
- After School 3, he would find a job in the movie industry with probability 0.1 and in the financial industry with probability 0.9.

Hint: The set of professional occupations is the set of outcomes and the different schools correspond to different lotteries over this set of outcomes.

We assume that School 2 is the least preferred option of the decision-maker and that he is indifferent between School 1 and School 3.

1) Give a representation of the utility function of this decision-maker.
Hint: once you have identified the best and the worst outcomes, you can assign them arbitrary values, e.g. 0 *and* 1.

2) We assume that a new school (School 4) opens. After school 4, a student would find a job in each industry with probability $\frac{1}{3}$. How would the new school rank compared to Schools 1, 2, 3 ?

3) There are too many application in School 4. The ministry of education decides that rather than applying to School 4 directly, the decision-maker must apply to a lottery that leads to admission in School 4 with probability $\alpha \in [0, 1]$ and to admission in School 2 with probability $1 - \alpha$. For which value of α does the decision-maker prefers to apply to School 1 rather than to School 4 ?

Exercise 2 (25 minutes). We consider a setting with two commodities and one firm. The firm produces commodity 2 using commodity 1 as an input. The firm has two possible technologies. The production function of the first technology if $f_1(z) = \sqrt{z}$ and the production function of the second technology is $f_2(z) = z$, where $z \geq 0$.

1) If the firm has 0.5 units of commodity 1, which production technology shall it use to produce the maximum quantity of output ?
2) If the firm has 2 units of commodity 1, which production technology shall it use to produce the maximum quantity of output ?
3) In general, determine as a function of $z \in \mathbb{R}_+$, the maximal quantity of output the firm can produce using z units of input. Then, determine the production set Y of the firm and represent it graphically.
4) Prove that Y satisfies free-disposal.