

TUTORIAL 1 – PREFERENCES, INFORMATION AND REPRESENTATION**Due to: September 30, 2016****Exercise 1: Preferences**

A decision-maker's preferences over the set $A = \{a, b, c\}$ are represented by the payoff function u for which $u(a) = 0, u(b) = 1$, and $u(c) = 4$. Are they also represented by the function v for which $v(a) = -1, v(b) = 0$, and $v(c) = 2$? Why ? How about the function w for which $w(a) = w(b) = 0$ and $w(c) = 8$?

Exercise 2: Representation

An entrepreneur tries to decide whether to start a dry cleaning store in a town that is already served by one dry cleaner or to stay out. We will call the two firms “New Cleaner” and “Old Cleaner”, respectively. New Cleaner is uncertain about whether the economy will be in a recession (probability 0.3) or not, which will affect how much consumers pay for dry cleaning, and must also worry about Old Cleaner. Regardless of New Cleaner decision, Old cleaner may entry in a price war (probability 0.5) or he may keep his initial high prices.

1. How many players are in this game?
2. How can you represent the uncertainty New Cleaner faces regarding economic activity?
3. Determine the action set of each player
4. Regarding the outcome, in case of normal economic activity, for New Cleaner outcomes (in thousand euro) they are equal to 0 if he stays out regardless the decision of Old Cleaner. His outcomes are equal to -100 if he enters and Old cleaner engages in a price war; and 100 if he enters and Old Cleaner maintains his high prices. For the Old Cleaner, they are equal to -50 if he engages in price war and New cleaner enters, 100 if he maintains his high prices and New Cleaner enters; If New Cleaner stays out, his outcomes are equal to 50 in case of war price and 300 in case of high prices. In case of recession, outcomes are 60 lower than in case of normal economic activity for every possible combinations of actions. Assuming the following order of moves: New Cleaner decision, next Old cleaner decision and finally the state of economic activity, represent the extensive form of the game.
5. Assume now the following order of moves: State of economic activity, New cleaner and Old Cleaner. Represent the corresponding extensive form game

6. Represent two different strategic form. The first one for a normal economic activity and the second for an economy in recession

Exercise 3 – Extensive form and Information set

1. Recall the definition of an information set
2. Suppose the following three-stage game (game played in 1984, 1985 and 1986) and the following sequence: Smith moves at node S1 in 1984 and he can choose between Top (leading to the node J1), Middle (leading to the node J2), lower (leading to the node J3) and bottom (leading to the node J4). Next, Jones can move at nodes J2, J3 or J4 in 1985 or at node J1 in 1986. Smith knows his own move, but Jones can only know whether Smith has chosen the move which lead to J1, J2, or “other”; this means that Jones cannot distinguish between J3 and J4. Regardless of the decision of Smith, Jones can choose between 2 actions : A and B. After Jones’ decision, the game ends. At terminal nodes J1 and J2, the payoffs are (1,1); at the terminal node J3, the final payoff are (4,4) and at the terminal node J4, the final payoffs are (8,8). Represent the extensive form of this game
3. Determine the set of information for each player if Smith has chosen the move leading to J3
4. Assume now that Nature acts first instead of Smith, does it change the information set of John
5. Represent the corresponding strategic form game

Exercise 4. The nature of information

1. Describe the scenario of a game with perfect information and represent the corresponding extensive form
2. Describe the scenario of a game with imperfect information and represent the corresponding extensive form

Exercise 5. Harsanyi’s transformation

Consider the two-player game that follows. Arthur has two available actions: a_1 and a_2 and Barbara b_1 and b_2 . The payoffs of both players depend on Barbara’s success in her final exam. Arthur and Barbara do not know the issue of Barbara’s exam when they have to choose their action. Below are the corresponding strategic forms depending on Barbara’s success.

Table 1: Succeed

		Barbara	
		b_1	b_2
Arthur	a_1	2,0	1,-1
	a_2	1,1	0,2

Table 2: Not succeed

		Barbara	
		b_1	b_2
Arthur	a_1	-1,1	-1,2
	a_2	0,2	0,1

Apply the Harsanyi's transformation and represent the extensive form game corresponding