200C – Game Theory – Professor Giacomo Bonanno

PRACTICE PROBLEMS 6

Topic: Nash equilibrium

VERY IMPORTANT: do **not** look at the answers until you have made a VERY serious effort to solve the problem. If you turn to the answers to get clues or help, you are wasting a chance to test how well you are prepared for the exams. I will **not** give you more practice problems later on.

1. Find all the Nash equilibria of game B in Problem 3 of set 1.

2. Amy, Barbara and Carol are independently thinking of getting a tattoo. They are meeting at a party in a few days. Each has to decide whether or not to go to the tattoo parlor. For each of them the most preferred outcome is one where she shows up with a tattoo and at least one of her friends also does (being indifferent between being one of two or one of three). The least preferred outcome is to be the only one of the three with a tattoo. The middle-ranked outcomes are the ones where she does not have a tattoo (she is indifferent among those outcomes).

Represent this situation as a normal-form game and Find all the Nash equilibria

3. Roberto, Caroline and Max work at the urban planning department in the city hall of a small town. They have the possibility of replacing the plotter they use with one of the new versions available in the market. The options are either a high-speed plotter with a medium resolution (H) or a low-speed plotter with a much better resolution (L).

While Roberto and Caroline are eager to change their old plotter, Max, who hates changes, prefers to stick to their old plotter. Roberto and Caroline do not agree on the model of the new plotter though. Roberto likes the high-speed plotter and dislikes the low-speed plotter. In fact, he'd rather keep the old plotter than get the low-speed. On the other hand, Caroline's first choice is the low-speed plotter, and then she prefers the old plotter to the high-speed one. Max is indifferent between the low-speed and the high-speed plotter; he dislikes them equally.

Given the discrepancy of opinions they decide to take a vote on whether they should keep the old plotter, change it for the high-speed plotter or for the low-speed one. They'll choose the option that gets most of the votes and, in the case of a tie, they'll stay with the status quo, i.e., no change will be made and they'll keep the old plotter.

A. Represent this situation as a matrix game.
B. Identify the dominated strategies for each player.
C. What would most likely be the result of the game?
D. Find the Nash equilibria.
E. How would things be different if Roberto preferred to change the plotter to keeping the old one (i.e., if he preferred the high-speed plotter to the low-speed plotter, and the low-speed plotter to the old plotter)?

4. Find all the Nash equilibria of the following game.

		Player 2		
		F	G	H
Player 1	C	0 , 0	2 , 0	1 , −1
	D	−1 , 0	1 , 2	2 , 1
	E	0 , 1	2 , 1	3 , 2
		0 , 2	2 , 3	3 , 3