LECON2112 Advanced Microeconomics II

– Assignment 5 –

Professor Benoît Decerf

TA: Thomas Eisfeld

Deadline: Monday, March 18, 2024 at 5pm.

Instructions: To be submitted via Moodle as a single file (including your name and NOMA).

Exercises[1]

8Ea. Let $I = \{1, 2\}$, $S_1 = (T, B)$, and $S_2 = (L, R)$. With probability $\frac{1}{3}$, agent 2 is of type a, and with probability $\frac{2}{3}$, she is of type b. Agent 1 does not know the type of agent 2 (but these probabilities are common knowledge). Depending on the type of agent 2, they play either of the matrices as shown below. Compute the pure strategy Bayesian Nash equilibria of this game.

Type a

	L	R
T	6, 12	4, 6
B	3,6	9,0

Type b

	L	R
T	6, 0	4, 4
B	3,4	9,12

8Ee. Let $I = \{1, 2\}$, $S_1 = (T, B)$, and $S_2 = (L, R)$. With probability p_a, agent 2 is of type a, and with probability p_b, she is of type b ($p_a + p_b = 1$). Agent 1 does not know the type of agent 2 (but probabilities are common knowledge). Depending on the type of agent 2, they play either of the matrices as shown below, which denote the game forms. If information were complete, then (T,L) and (B,R) would be two pure strategy Nash equilibria if agent 2 were of type a, and (T,R) and (B,L) two pure strategy Nash equilibria if she were of type b. Identify two pure strategy Bayesian Nash equilibria of this game.

Type a

	L	R
T	x	y
B	z	w

Type b

	L	R
T	r	s
B	t	v

8Eb. Two agents, 1 and 2, have to share a dollar. Each agent can choose to enter into a conflict or not. If no agent chooses the conflict, then the dollar is divided evenly, and this is the payoffs. As soon as one agent chooses to enter into a conflict, the conflict follows.

[1] Inspired by Mas-Colell, Whinston, & Green, 1995. "Microeconomic Theory," Oxford University Press.

The agent who looses the conflict gets a payoff of zero. the winner of the conflict gets a payoff of δ. Each agent is either weak or strong. The probability that an agent is strong is π. Probabilities are independently distributed. In case of a conflict, if the two agents are of the same type, then they both have a probability of winning equal to 0.5. In case a strong agent is in conflict with a weak agent, the former wins the conflict with probability $q > 0.5$. Assume $\delta < 1$.

(a) What is a strategy in that game?

(b) What is the payoff function?

(c) What is, or what are, the Bayesian Nash equilibrium, or equilibria, of that game, as a function of the values of δ, π and q?

(d) What is the probability of a conflict?