GAME THEORY

Assignment 1

Instructions

You must answer all questions of this assignment. Each question carries equal weight. This is an individual project and accounts for 10% of your final grade on this course. The project is due by 21.00 on 23/04/2024. You can submit a handwritten copy in class, or you can send it via email to efilipp@uom.edu.gr. Should you choose to send your assignment via email you must submit a SINGLE FILE (either scan your handwritten copy or submit a typed assignment). Late assignments WON'T be accepted.

Exercise 1 (50%) Consider a static game between two players as described by the payoff matrix below:

		Player 2		
		Left	Center	Right
Player 1	Up	2, 2	0, 1	4, 3
	Middle	1, 0	3, 2	1, 1
	Down	0, 3	2, 1	3, 1

a. What are the actions/strategies sets for the two players?
b. Consider only pure strategies. Is there any strictly dominated strategy for player 1? Is there any strictly dominated strategy for player 2? Explain your answer.
c. What is (are) the Nash Equilibrium (Equilibria) in pure strategies? Explain your answer.
d. Is there a coordination failure in this game? Explain your answer.
e. Is there a Nash Equilibrium in Mixed strategies? Fully identify it.

Exercise 2 (50%) Consider a scenario involving 5 players. Each player i is required to simultaneously submit an integer, x_i, between 1 and 100 alongside the other players. The player whose submitted number is closest to half the average of all submitted numbers, i.e. closer to

$$\frac{x_1 + x_2 + x_3 + x_4 + x_5}{10}$$

will be awarded a prize (say, 3000 euros; the value of the prize is irrelevant to the problem). Should there be multiple winners, the prize will be divided equally among them. Those who do not win will receive nothing. Determine the Nash Equilibrium of this game.