

Introduction to Game Theory

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Exercise Sheet 2

Due: Monday, April 30, 2018

Exercise 2.1 (Elimination of strictly dominated strategies, 3+1 points)

Consider the game $G = \langle N, (A_i)_{i \in N}, (u_i)_{i \in N} \rangle$ with $N = \{1, 2\}$, $A_i = \{a_i, b_i, c_i, d_i\}$, $i = 1, 2$, and the following payoff matrix.

		Player 2			
		a_2	b_2	c_2	d_2
Player 1	a_1	6, 2	2, 7	1, 4	0, 3
	b_1	1, 0	3, 2	2, 1	1, 1
	c_1	7, 0	2, 2	1, 5	6, 1
	d_1	8, 4	1, 2	0, 2	3, 9

- Iteratively eliminate strictly dominated strategies for as many steps as possible. In each step, specify which strategy of which player was eliminated and by which strategy it was strictly dominated.
- Specify the set of Nash equilibria in this game. Which action should player 1 play accordingly?

Exercise 2.2 (Minimax strategy profiles, 1.5+1.5 points)

Let G be a two-player zero-sum game that has a Nash equilibrium.

- Show that if some of player 1's payoffs are increased in such a way that the resulting game G' is also a zero-sum game then G' has no Nash equilibrium in which player 1 gets a lower payoff than he got in the Nash equilibria of G .
- Show that the game G' that results from G by elimination of one of player 1's strategies does not have a Nash equilibrium in which player 1's payoff is higher than it is in the Nash equilibria of G .

Exercise 2.3 (Nash equilibria in zero-sum games, 1 point)

Prove the following claim or give a counterexample: If G is a two-player zero-sum game that has a Nash equilibrium with payoff v for player 1 then every strategy profile in G with payoff v for player 1 is a Nash equilibrium.

The exercise sheets may and should be worked on and handed in in groups of three students. Please indicate both names on your solution.