Introduction to Game Theory

B. Nebel, R. Mattmüller, S. Wölfl
T. Schulte, D. Speck
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University of Freiburg
Department of Computer Science

Exercise Sheet 2

Due: Tuesday, May 10, 2016

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	$8, 4$	$1, 2$	$0, 2$	$3, 9$

(a) 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.

(b) 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 zero-sum game that has a Nash equilibrium.

(a) 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.

(b) 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, 2 points)

Prove the following claim or give a counterexample: If G is a 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 two to three students. Please indicate all names on your solution.