Introduction to Game Theory

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Exercise Sheet 2

Due: Friday, May 29, 2020

Exercise 2.1 (Nash equilibria, 2 points)

Consider the following strategic game:

		Player 2		
		X	Y	Z
Player 1	A	$1,1$	$2,1$	$0,2$
	B	$1,1$	$0,1$	$2,2$
	C	$2,2$	$1,0$	$1,1$

Determine and write down all Nash equilibria.

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.

(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 (Best response function, 3 points)

Let $G = \langle N, (A_i)_{i \in N}, (u_i)_{i \in N} \rangle$ with $N = \{1, 2\}$, $A_1 = A_2 = \mathbb{R}^{\geq 0}$, $u_1(a_1, a_2) = a_1(a_2 - a_1)$ and $u_2(a_1, a_2) = a_2(1 - \frac{1}{2}a_1 - a_2)$ for all $(a_1, a_2) \in A$.
Define all Nash equilibria of this game by constructing and analyzing the best response function of both players.

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.