Game theory

B. Nebel, S. Wölfl, R. Mattmüller
C. Becker-Asano, Y. Alkhazraji
Summer term 2013

University of Freiburg
Department of Computer Science

Exercise Sheet 3
Due: Monday, May 6, 2013

Exercise 3.1 (Nash equilibria, 1+1 Punkte)

Recall the bar scene from the film "A Beautiful Mind" (in case you have not seen the movie or you do not remember the scene: `http://www.haverford.edu/math/lbutler/GoverningDynamics.mov`).

(a) Formalize the game for two men/women, where the payments are 2, 1 und 0 for both, if they win the heart of the blond, a brunette or none of the other guests, respectively.

(b) Is the analysis in the film correct? Analyze the game for pure Nash equilibria.

Exercise 3.2 (Best-response-function, 3 Points)

Let $G = \langle N, (A_i)_{i \in N}, (u_i)_{i \in N} \rangle$ mit $N = \{1, 2\}$, $A_1 = A_2 = \mathbb{R}^{\geq 0}$, $u_1(a_1, a_2) = a_1(a_2 - a_1)$ und $u_2(a_1, a_2) = a_2(1 - \frac{1}{2}a_1 - a_2)$ for all $(a_1, a_2) \in A$.

Define all Nash-equilibira of this game by constructing and analyzing the best-response-function of both players.

Exercise 3.3 (Payoff in Nash equilibria, 3 Points)

Define the payoff matrices of the two-player games G amd G' that have the following properties: G' is derived from G by increasing some of the the payoff values of player 1 and keeping the all payoff values of player 2 unchanged. In addition, G' has a Nash-equilibrium, in which player 1 receives lower payoff than in all Nash equilibria of G. Also, G must have at least one Nash equilibrium.

The exercises should be solved **in groups of two students.** Please provide both of your names on the solution sheets.