



Exercises for Algorithmic Game Theory

<http://www.mpi-inf.mpg.de/departments/d1/teaching/ss11/AGT/>

Assignment 1

Deadline: Mo 22.11.12

Exercise 1 *Variations on the Prisoner's Dilemma*

- Let the costs in the case where both players confess be 4 and $a \in \mathbb{R}^+$ (Player 2 gets a instead of 4). Determine the Nash equilibria of this game for all $a \in \mathbb{R}^+$.
- Suppose both players receive b in case they are both silent (all other costs are as in the standard prisoner's dilemma). Determine the Nash equilibria of this game for all $b \in \mathbb{R}^+$.

Exercise 2 *Chess*

Chess can be formulated as a simultaneous move game in standard form. Explain what the matrix would look like. You do not need to write down the full matrix. (Note that a *move* of a player cannot be a chess move; instead, a move in this context is a selection of a strategy.)

Exercise 3 *Number of Nash equilibria in a game*

Give a 2-player game (in matrix form) where player 1 has 3 strategies, player 2 has 4 strategies, and there are 10 Nash equilibria.

Exercise 4 *Matching pennies*

Consider the following game.

1 2	Heads	Tails
Heads	1,-1	-1,1
Tails	-1,1	1,-1

Give a *mixed* Nash equilibrium for the matching pennies game. Prove that it is the only Nash equilibrium. (What happens if player 1 deviates from the strategy suggested by it?)