Introduction to Game Theory

B. Nebel, R. Mattmüller
T. Schulte, D. Speck
Summer semester 2019

University of Freiburg
Department of Computer Science

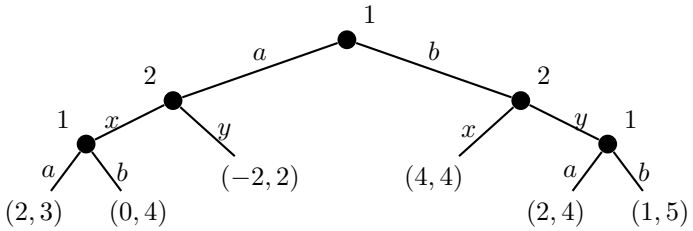
Exercise Sheet 5

Due: Thursday, May 30, 2019

Send your solution to `schultet@informatik.uni-freiburg.de` (PDF only) or submit a hardcopy before the lecture. The exercise sheets may and should be worked on and handed in in groups of three students. Please indicate all names on your solution.

Exercise 5.1 (Subgame perfect equilibria, 2 points)

Determine all subgame perfect equilibria of the extensive form game defined by the following game tree.



Exercise 5.2 (Uniqueness of SPE, 2 points)

Prove the following claim or give a counterexample: For any extensive two-player game Γ with s^* and r^* being subgame perfect equilibria of Γ, it holds that $u_i(O(s^*)) = u_i(O(r^*))$.

Exercise 5.3 (Repeated Games, 2 + 2 points)

Consider the infinitely repeated prisoner's dilemma. The payoff matrix of the stage game is given below.

		Player 2	
		C	D
Player 1	C	$3, 3$	$0, 10$
	D	$10, 0$	$1, 1$

(a) Under the discounting preference criterium, for which discount factor $0 < \delta < 1$ is (Grim, Grim) a Nash equilibrium? Justify your answer.

(*Hint:* The Grim strategy starts with playing C. After any play of D it plays D forever.)

(b) Consider the following three payoff profiles under the limit-of-means preference criterium: 1. $(2, 2)$, 2. $(10, 10)$, and 3. $(3, 0)$. For each payoff profile, either construct two automata that form a Nash equilibrium or argue that no Nash equilibrium with the given payoffs exists.