Algorithmic game theory — Homework 1[1]
Nash equilibria

assigned 10.10.2022, deadline 31.10.2022

Please choose a nickname and write it on the paper with your solutions (as well as your name), or send it by e-mail.

Homework 1. *Compute mixed Nash equilibria in the Game of chicken and formally show that no other Nash equilibria exist in this game.* **[2]**

Homework 2. *Watch the scene from A Beautiful Mind where the John Nash character played by Russell Crowe explains what a Nash equilibrium is. Assume that the scenario described is modeled as a game with four players (the men), each with the same five actions (the women). Explain why the solution proposed in the movie is not a Nash equilibrium.* **[1]**

Homework 3. *There are $n \geq 2$ people on the street who all notice an injured man. Each one of them has two possible actions, either helping the injured man or not. If nobody helps the man, everybody gets payoff 0. If somebody helps, all get payoff 1, but anybody who offered help has to subtract c from his payoff, where $0 < c < 1$. Find a* symmetric Nash equilibrium *of this game, that is, equilibrium where all players use the same strategy. What is the probability the man is helped at all? Is it good for the injured man to have more witnesses around?* **[3]**

Homework 4. *Consider the game in which two players choose non-negative integers of size at most 1000. Player 1 chooses an even integer, while player 2 chooses an odd integer. When the players announce their number, the player who chose the lower number wins the number he announced in dollars. Find all pure Nash equilibria of this game.* **[2]**

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[1]Information about the course can be found at http://kam.mff.cuni.cz/~balko/