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Algorithmic Game Theory

Summer Term 2024

Tutorial Session - Week 2

You are supposed to work on these tasks in class together with your fellow students. Please find groups of 2 or 3 students!

If you do not know each other yet, each of you could start with a very quick introduction: What's your name? Do you study Computer Science or maybe something else (Maths, Economics,...)? Do you have any prior knowledge in Algorithmic Game Theory already or is this your first course in AGT?
Afterwards, you are supposed to discuss the exercises on this sheet. Note that you should see this also as a chance to talk about definitions, proof ideas and techniques used in the lecture in addition to only working out a formal solution for the tasks. If you do not know a definition or theorem by hard, feel free to open the lecture notes and have a look. Further, if you have any questions, I will drop by to discuss possible issues with you.

If there is some remaining time at the end of the tutorial, you can share your ideas on the tasks with the whole group.

Exercise 1:
Consider the following cost-minimization game. Two car drivers approach a junction. Both drivers can either stop at (S) or cross (C) the junction. If a driver decides to stop, small costs emerge to her because of the waiting time. If both drivers decide to cross the junction, they will crash - resulting in high costs for both drivers. List all pure and mixed Nash equilibria.

	C(ross)	S(top)
C(ross)	100 100	1 0
S(top)	0 1	1 1

Exercise 2:

a) Specify the payoff matrix for the well-known game rock-paper-scissors[1]. Assume that winning has a cost of -1, losing a cost of 1, a tie a cost of 0.

b) Mark the best responses with boxes. Do we have a pure Nash equilibrium?

c) Compute a mixed Nash equilibrium. Could you have guessed it?

[1] `https://en.wikipedia.org/wiki/Rock_paper_scissors`