

Algorithmic Game Theory

Winter Term 2020/21

Tutorial Session - Week 4

As last week, you are supposed to work on these tasks in class together with your fellow students. Therefore, once entered the Zoom Breakout-Rooms, switch on your camera and microphone and start with a quick introduction if you don't know each other yet. 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.

Exercise 1:

State for each $M \geq 1$ a network congestion game with two players such that the Price of Anarchy of pure Nash equilibria is at least M .

Exercise 2:

A *fair cost-sharing game* is a congestion game such that for all resources $r \in \mathcal{R}$ the delay function can be modeled as $d_r(x) = c_r/x$ for a constant c_r . Show that fair cost sharing games with n players are $(n, 0)$ -smooth.