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Algorithmic Game Theory

Summer Term 2024

Tutorial Session - Week 9

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

Exercise 1:
Consider the following instance of the house-allocation problem. There are six agents $a, \ldots, f$ and their preferences are given by:

$$a : f > d > e > c > a > b, \qquad b : a > c > e > f > b > d,$$
$$c : e > f > a > c > b > d, \qquad d : f > a > b > c > d > e,$$
$$e : d > e > c > b > f > a, \qquad f : e > a > b > c > f > d.$$

Find a stable allocation π using the Top Trading Cycle Algorithm.

Exercise 2:
In the Top Trading Cycle Algorithm initially player i owns house i. Consider a group $S \subseteq \{1, \ldots, n\}$ of players trying to cheat in the following way: The agents in S permute their houses before entering the mechanism. However, they reveal their preferences over houses truthfully.

Is there an instance where it is possible for a group S to improve at least one player in S by cheating in the above way while no other player of S gets worse? Prove your answer.