

Algorithmic Game Theory

Summer Term 2025

Tutorial Session - Week 5

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

Exercise 1:

Consider the following single-item auction with $n \geq 2$ bidders. The bidders simultaneously submit their bids $b_i \geq 0$. However, the item will always be allocated to the bidder with index 1 and the mechanism will make him/her pay the bid of the bidder with index 2.

- (a) Show that the described mechanism is truthful.
- (b) We call a mechanism *individually rational* if for all bidders $i \in \mathcal{N}$ bidding truthfully against an arbitrary bid profile of the other players never leads to a negative utility: If $v_i(x) \geq 0$ for all allocations $x \in X$, then $u_i((v_i, b_{-i}), v_i) \geq 0$.

Show that the given mechanism is not individually rational.