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Algorithmic Game Theory

Summer Term 2024

Tutorial Session - Week 8

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:
Recall the results for posted prices in combinatorial auctions with unit-demand bidders from
Lecture 19. We now want to consider how the social welfare changes when overpricing the
items.

a) Let $p_j = (1-\delta)\mathbb{E}\left[v_{\text{OPT},j}\right]$ for some $\delta < \frac{1}{2}$. Can you state a result similar to Theorem
19.2?

b) Now suppose we have full knowledge about the bidders valuation and let $p_j = v_{\text{OPT},j}$.
Show that for any $\epsilon > 0$ there exists an instance such that the social welfare obtained
by the posted-prices mechanism it at most $\epsilon \sum_{i \in M} v_{\text{OPT},j}$.
It suffices to consider instances with just two bidders and two items.