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Algorithmic Game Theory
Winter Term 2021/22
Tutorial Session - Week 7

Exercise 1:
Consider the following *Procurement Auction.* It's being attempted to buy a certain item. There are n vendors who are able to manufacture the wanted item. Vendor i incurs a cost of c_i for crafting the item. Now, the vendors are asked to state their costs for crafting the item and a vendor with lowest cost shall be chosen. The latter potentially gets a payment for it. The stated problem can be formalized by the general model of the lecture: Each vendor i is interpreted as a bidder who has negative valuation v_i, if he/she is chosen to craft the item, that is, $v_i(x) = -c_i$, if i is chosen in x.

The results of the lecture concerning VCG are applicable in this situation. Make use of them in order to state a truthful mechanism.

Exercise 2:
Consider a single-parameter problem and let f be the function that maximizes $\sum_i b_i x_i$ among all $x \in X$ (declared welfare). Show that f is monotone.