Coursework #5

$$\boxed{\textbf{Deadline: Friday, 16 May 2008, 5:00pm}}$$

Question 1 (10 marks)

This is a question about mechanism design in the context of combinatorial auctions. Suppose that the auctioneer can accept any combination of atomic bids from the same bidder, as long as bundles do not overlap (this is the so-called OR-language). Consider the following variation on the VCG mechanism, where payments are computed with respect to atomic bids rather than with respect to bidders: each bidder pays for each of their accepted bids the price offered, less a discount computed as the difference of the actual overall value and the overall value that would have been attainable without that bid. Is truth-telling still a dominant strategy for this modified mechanism? Either prove that it is or give an example that shows how the mechanism can be manipulated.

(Adapted from a homework question set by T. Sandholm, Carnegie Mellon University, 2005.)

Question 2 (10 marks)

(a) For $K \in$, the *K-budget valuation* is defined as $v(X) = \min\{K, |X|\}$. Give a succinct representation of this valuation in the OR/XOR language.

(b) Express the monochromatic valuation in the OR* bidding language. How many dummy items are required?

(c) Give two examples for (classes of) valuations that are both monotonic and dichotomous. One of these should be representable in the OR language in polynomial space; the other one should be a valuation that requires exponential space in the OR language.