

Homework #1

1. Prove the 5 year olds wrong, that is prove that repeated RSP has no pure dominant strategy. (Note that strategy can depend on the entire history of the game so far!) [5pt]
2. Prove that VCG is truthful. Must consider that there are n bidders and m goods and that a bidder might get more than one good. [15pt]
3. Continuing problem above. Prove that the payment of bidder i for whatever goods he gets is less than his total utility for the same goods. [15pt]
4. Prove that if reserve prices are introduced as The VCG Example slide (Alice and Bob bidding for two apples) with n items and n bidders, then the seller will get at least the reserve price for every item sold, even when bidders are allowed to get more than one item. (Bidders get items according to the maximum total utility assignment). [15pt]
5. Read Internet Advertising and the Generalized Second Price Auction: Selling Billions of Dollars Worth of Keywords by B. Edelman, M. Ostrovsky and M. Schwartz
<http://rwj.berkeley.edu/schwarz/publications/gsp051003.pdf> Section 1-3 (the rest is optional)
6. Prove the formula on slide 75 titled "Adaptation of VCG to sponsored search" (The recurrence for payments). [15pt]
[Hint: all these proofs are only a few lines each and need almost no notation – if you find yourself writing complicated formulas you are on a wrong track.]
7. Play a little with e-bay (<http://www.ebay.com>) but please do not place any bids! Also check-out <http://www.esnipe.com/> or <http://www.auctionsniper.com> to understand how you can place "sealed bids".