Exercises from lecture 6 (auctions) TEK5010 Multiagent systems 2019

Question 1

3 agents $Ag = \{1,2,3\}$ are to decide on the allocation of 3 different resources (or perhaps tasks?) $Z = \{a, b, c\}$. They decide that a combinatorial auction is the preferred mechanism that they will use in order to distribute the resources among themselves.

a. Agents/bidders are making XOR bids representing their valuation function:

$\beta_1 = (\{a\}, 4)XOR(\{c\}, 2)XOR(\{a, b\}, 7)XOR(\{a, b, c\}, 8)$
$\beta_2 = (\{b\}, 1)XOR(\{c\}, 5)XOR(\{a, b\}, 10)XOR(\{b, c\}, 17)$
$\beta_3 = (\{a\}, 1)XOR(\{c\}, 3)XOR(\{a, b\}, 4)XOR(\{a, b, c\}, 14)$

Could you evaluate the valuation functions for the agents in terms of the following bundles:

$v(\{a\}), v(\{b\}), v(\{c\})$
$v(\{a, b\}), v(\{a, c\}), v(\{b, c\})$
$v(\{a, b, c\})$

b. Determine the winner in this auction assuming the auctioneer is maximizing social welfare. (Hint, since there is a limited number of possible outcomes you could enumerate and evaluate all bundles in a comparative analysis.)

c. Could you explain the VCG-mechanism? What are the pros and cons of using the VCG-mechanism in auctions?

d. What is the price each agent has to pay if we use the VCG-mechanism for evaluating the given auction?