

Question 1

The goods $Z = \{a, b, c\}$ are to be auctioned and the bidders $Ag = \{1,2,3\}$ are interested in bidding in this auction. This makes it a combinatorial auction.

The bidders are making XOR bids representing their valuation function:

$$\beta_1 = (\{a\}, 3)XOR(\{c\}, 1)XOR(\{a, b\}, 5)XOR(\{a, b, c\}, 7)$$

$$\beta_2 = (\{c\}, 5)XOR(\{a, b\}, 6)XOR(\{a, b, c\}, 14)$$

$$\beta_3 = (\{b\}, 3)XOR(\{c\}, 4)XOR(\{a, b\}, 11)XOR(\{b, c\}, 15)$$

a) What is the valuation function for the bidders 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) What is the price each agent must pay if we use the VCG mechanism instead?