

Exercises from L6 (auctions)

Question 1

a) Evaluate the valuation functions

		1	2	3
$U(\{a\})$	→	4	0	1
$U(\{b\})$	→	0	1	0
$U(\{c\})$	→	2	5	3
$U(\{a,b\})$	→	7	10	5
$U(\{a,c\})$	→	4	5	3
$U(\{b,c\})$	→	2	7	3
$U(\{a,b,c\})$	→	8	17	14

b) Determine winners in auction if auctioneer is max SW

	1	2	3	T
$\{a\}, \{b\}, \{c\}$	$\{a\}=4$	$\{c\}=5$	0	9
$\{ab\}, \{c\}$	0	$\{ab\}=10$	$\{c\}=3$	13
$\{ac\}, \{b\}$	0	$\{ac\}=5$	0	} 5
$\Rightarrow \{bc\}, \{a\}$	$\{ac\}=4$	$\{b\}=1$	0	
	$\{a\}=4$	$\{bc\}=17$	0	21
$\{abc\}$	0	$\{abc\}=17$	0	17

Winners: $A_{g_1} = \{a\}$, $A_{g_2} = \{bc\}$, $A_{g_3} = \{\emptyset\}$

c) The VCG-mechanism is to pay compensation to the other players
loss when you participate in auction.

Second-price, sealed-bid, auction (i.e. one-shot)

Pros: VCG is incentive compatible
(optimal to bid true valuation function)

Cons: NP-hard to calculate (and represent)
Hard to understand? for the bidders
and auctioneer.

A_5	1	2	3	T
$\{a\} \{b\} \{c\}$	0	$\{c\} = 5$	$\{a\} = 1$	6
$\{ab\} \{c\}$	0	$\{ab\} = 10$	$\{c\} = 3$	13
$\{ac\} \{b\}$	0	$\{ac\} = 5$	0	5
$\Rightarrow \{bc\} \{a\}$	0	$\{bc\} = 17$	$\{a\} = 1$	18
$\{abc\}$	0	$\{abc\} = 17$	0	17

$$P_i = 1 - 0 + 17 - 17 = \underline{\underline{1}}$$

A_{S_2}	1	2	3	T
$\{a\} \{b\} \{c\}$	$\{a\} = 4$	0	$\{c\} = 3$	7
$\{ab\} \{c\}$	$\{ac\} = 7$	0	$\{c\} = 3$	10
$\{ac\} \{b\}$	$\{ac\} = 4$	0	0	4
$\{bc\} \{a\}$	$\{a\} = 4$	0	$\{bc\} = 3$	7
$\Rightarrow \{abc\}$	0	0	$\{abc\} = 14$	14

$$P_2 = 0 - 4 + 14 - 0 = \underline{\underline{10}}$$

A_3	1	2	3	T
$\{a\} \{b\} \{c\}$	$\{a\} = 4$	$\{c\} = 5$	0	9
$\{ab\} \{c\}$	$\{ab\} = 7$ $\{c\} = 2$	$\{c\} = 5$ $\{ab\} = 10$	0	} 12
$\{ac\} \{b\}$	$\{ac\} = 4$ 0	$\{b\} = 1$ $\{ac\} = 5$	0	
$\Rightarrow \{bc\} \{a\}$	$\{a\} = 4$	$\{bc\} = 17$	0	} 5
$\{abc\}$	0	$\{abc\} = 17$	0	
			0	21 17

$$P_3 = 17 - 17 + 4 - 4 = \underline{\underline{0}}$$