CISC 489

Homework 4

May 16, 2022

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**Problem 1**

Part A. Complete the table provided in the assignment.

|  |  |  |
| --- | --- | --- |
|  |  | Shapley |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Part B. Compute the Shapley value for each student. **Included in table.**

Part C. “True or false: this game is additive”: **False**

Part D. “True or false: this game is superadditive”: **True**

Part E. “True or false: this game is constant-sum”: **True**

Part F. “True or false: the core of this game is empty”: **True**

**Problem 2**

Part A. Show the value (collected) revenue of each possible consumer coalition

|  |  |  |
| --- | --- | --- |
| Customer 1 | {P1, P3, P4} | $6 |
| Customer 2 | {P3, P4} | $4 |
| Customer 3 | {P2, P4} | $1 |
| Customer 4 | {P2} | $2 |

Part B. What is the social welfare maximizing solution?

Part C. What is the corresponding coalition structure?

Part D. Is the coalition structure stable according to the core solution concept (justify your answer)?

Part E. How would the answers to a,b,c,d change if customer 4 would only be willing to pay $1 instead of $2?

**Problem 3**

Part A. What is your expected profit if you offer $3,000? Should you make such an offer?

Using our initial evaluation, we can then assume the price to be . Since we have planned on increasing the value of the car by , our next equation would be , and our profit will therefore be .

Part B. What is the highest offer that you can make without losing money on the deal?

When the above equation yields zero, then we would hit our maximum offer, which is .

**Problem 4**

I will be using page 308, section 14.3.3’s “The VCG mechanism” content to solve this problem.

What is the allocation produced under the VCG (Vickrey-Clarke-Groves) mechanism and what are the VCG payments of the players?

Terms

* is an agent
* is an allocation of goods to agents in

Steps

1. Every agent declares valuation function (provided in the table)
2. Compute allocation that maximizes social welfare, which is the sum of the valuations that each agent has for each good

|  |  |
| --- | --- |
| **Good** | **Allocation** |
| A |  |
| B |  |
| C |  |
| AB |  |
| BC |  |
| AC |  |
| ABC |  |