

Algorithmic Game Theory

Assignment 11

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1. Suppose we have at least 2 players. Let \mathcal{X} be the set of all dominant strategy incentive compatible social choice functions in the quasi-linear environment and \mathcal{Y} the set of all dominant strategy incentive compatible social choice functions in the single-parameter environment. Then, which one of the following is true?

- (a) $\mathcal{X} \subsetneq \mathcal{Y}$
- (b) $\mathcal{Y} \subsetneq \mathcal{X}$
- (c) $\mathcal{X} = \mathcal{Y}$
- (d) $\mathcal{X} \cap \mathcal{Y} = \emptyset$

The correct answer is (b). Refer to Lecture 11.1.

2. Which one of the following is not a single-parameter domain?

- (a) Auction of one item with one seller more than one buyer
- (b) Auction of one item with one buyer more than one seller
- (c) Auction of two identical items with one seller and one buyer
- (d) Auction of two different items with one seller and one buyer

The correct answer is (d). Refer to Lecture 11.1.

3. What is the domain of critical value function?

- (a) The set of all type profiles of all the players.
- (b) The set of all strategy profiles of all the players.
- (c) The set of all type profiles of all the other players.
- (d) The set of all strategy profiles of all the other players.

The correct answer is (c). Refer to Lecture 11.2.

4. Suppose we have at least 2 players. Let \mathcal{X} be the set of all monotone allocation rules in the single-parameter domain and \mathcal{Y} the set of all affine maximizers in the quasi-linear domain. Then, which one of the following is true?

- (a) $\mathcal{X} \subsetneq \mathcal{Y}$
- (b) $\mathcal{Y} \subsetneq \mathcal{X}$
- (c) $\mathcal{X} = \mathcal{Y}$
- (d) $\mathcal{X} \cap \mathcal{Y} = \emptyset$

The correct answer is (b). Refer to Lecture 11.2.

5. In which of the following domains, the critical value function is well-defined?

- (a) Single-parameter domain
- (b) Quasi-linear domain
- (c) Convex domain

(d) Any domain

The correct answer is (a). Refer to Lecture 11.2.

6. Which of the following conditions the allocation rule of a DSIC mechanism in a single-parameter domain must satisfy?

- (a) continuity
- (b) strictly increasing
- (c) non-decreasing
- (d) non-increasing

The correct answer is (c).

7. What does Myerson lemma characterizes?

- (a) Allocation rules which are implementable in a dominant strategy equilibrium in a quasi-linear environment.
- (b) Allocation rules which are implementable in a dominant strategy equilibrium in a single-parameter environment.
- (c) Allocation rules which are implementable in a Bayesian Nash equilibrium in a quasi-linear environment.
- (d) Allocation rules which are implementable in a Bayesian Nash equilibrium in a single-parameter environment.

The correct answer is (b). Refer to Lecture 11.4.

8. Which one of the following is a single-parameter domain?

- (a) Sponsored search auction
- (b) Auction of two different items with one buyer and two sellers
- (c) Auction of two different items with one seller and one buyer
- (d) Auction of two different items each having two copies with one seller and two buyer

The correct answer is (a). Refer to Lecture 11.5.

9. What property the allocation rule in the sponsored search auction satisfies?

- (a) Each component is strictly increasing.
- (b) Each component is strictly decreasing.
- (c) Each component is non-increasing.
- (d) Each component is non-decreasing.

The correct answer is (d). Refer to Lecture 11.5.

10. In a sponsored search auction, suppose there are 10 slots for the advertisements. How will the payment function of any player will look like?

- (a) step function having discontinuity at 9 points
- (b) step function having discontinuity at 11 points
- (c) step function having discontinuity at 10 points
- (d) arbitrary function having discontinuity at 9 points

The correct answer is (c). Refer to Lecture 11.5.