

# Algorithmic Game Theory

Algorithmische Spieltheorie

Pingo

Wintersemester 2022/2023

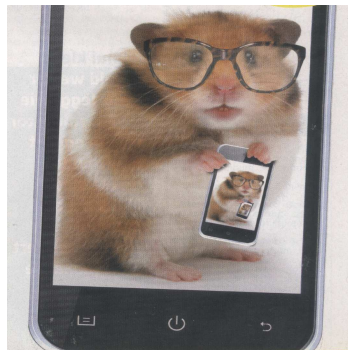
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## Website

<https://pingo.coactum.de/>

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## Question 1

Define a cooperative game  $(P, v)$  by  $v(C) = \|C\|$  for each  $C \subseteq P$ . Which of the following statements are true?

- A  $(P, v)$  is monotonic
- B  $(P, v)$  is not superadditive
- C  $(P, v)$  has an empty core
- D  $(1, \dots, 1)$  is in the core of  $(P, v)$
- E  $(P, v)$  is anonymous

## Question 2

Define a cooperative game  $(P, v)$  by  $v(C) = 0$  for each  $C \subseteq P$ .

Which of the following statements are true?

- A  $(P, v)$  is monotonic
- B  $(P, v)$  is not superadditive
- C  $(P, v)$  has an empty core
- D  $(1, \dots, 1)$  is in the core of  $(P, v)$
- E  $(P, v)$  is anonymous

## Question 3

Define a cooperative game  $(P, v)$  by  $P = \{1, 2, 3, 4\}$  and for each  $C \subseteq P$ ,  $v(C) = 1$  if  $C$  contains exactly one of 1 and 2 and exactly one of 3 and 4, and  $v(C) = 0$  otherwise.

Which of the following statements are true?

- A  $(P, v)$  is monotonic
- B  $(P, v)$  is not superadditive
- C  $(P, v)$  is convex
- D  $(P, v)$  is anonymous

## Question 4

Define a cooperative game  $(P, v)$  by  $P = \{1, 2, \dots, n\}$  and for each  $C \subseteq P$ ,  $v(C) = \sum_{i \in C} i$ . Which of the following statements are true?

- A  $(P, v)$  is monotonic
- B  $(P, v)$  is not superadditive
- C  $(P, v)$  has an empty core
- D  $(P, v)$  is anonymous

## Question 5

Let  $G$  be a superadditive game with four players and an empty core. Which of the following statements are possibly true?

A  $\tilde{\epsilon}(G) > 0$

B  $CoS(G) = 0$

C  $CoS(G) = 4 \cdot \tilde{\epsilon}(G)$

D  $CoS(G) = 5 \cdot \tilde{\epsilon}(G)$

## Question 6

Which of the following statements are true?

- A All cooperative games have stable sets.
- B Every cooperative game has exactly one stable set.
- C The core of a cooperative game is always a stable set.
- D If the core of a cooperative game is nonempty, it is contained in all its stable sets.



## Question 7

Do you want to watch Mr. and Mrs. Smith form a stable set in their final shoot-out scene?

- A Yes, I'd love to.
- B No, thanks.