

## In-Video Quizzes Week 7

Practice Quiz, 3 questions

3/3 points (100%)

**Congratulations! You passed!**

Next Item

1 / 1  
point

1.

Suppose  $N = 3$  and  $v(1) = v(2) = v(3) = 1$ .

Which of the following payoff functions is superadditive?

- ☐ a)  $v(1, 2) = 3, v(1, 3) = 4, v(2, 3) = 5, v(1, 2, 3) = 5$ ;
- ☒ b)  $v(1, 2) = 3, v(1, 3) = 4, v(2, 3) = 5, v(1, 2, 3) = 7$ ;

**Correct**

(b) is true.

- Use the definition of superadditivity to check that (b) is the answer.
- (a) is not superadditive because  $5 = v(2, 3 \cup 1) < v(2, 3) + v(1) = 5 + 1$ .
- (c) is not superadditive because  $0 = v(1 \cup 2) < v(1) + v(2) = 1 + 1$ .

- ☐ c)  $v(1, 2) = 0, v(1, 3) = 4, v(2, 3) = 5, v(1, 2, 3) = 7$ ;
- ☐ d) None of the above.

1 / 1  
point

2.

Suppose  $N = 2$  and  $v(1) = 0, v(2) = 2, v(1, 2) = 2$ .

What is the Shapley Value of both players?

- ☐ a)  $\phi_1(N, v) = 1, \phi_2(N, v) = 0$
- ☐ b)  $\phi_1(N, v) = 1/2, \phi_2(N, v) = 1/2$
- ☐ c)  $\phi_1(N, v) = 1/3, \phi_2(N, v) = 2/3$

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**Correct**

(d) is true.

- Use the definition of the Shapley Value to compute its value for each player.
- Another way to find the Shapley Value is to notice that player 1 is a dummy player:
  - when added to the unique coalition 1, 2, player 1's contribution is 0.
- By the theorem presented in the lecture, the Shapley Value satisfies the Dummy player axiom. Then,  $\phi_1(N, v)$  must be 0.

1 / 1  
point

3.

- Suppose  $N = 3$  and  $v(1) = v(2) = v(3) = 0, v(1, 2) = v(2, 3) = v(3, 1) = 2/3, v(1, 2, 3) = 1$ .

Which allocation is in the core of this coalitional game?

- ☐ a) (0,0,0);
- ☐ b) (1/3, 1/3, 0);
- ☒ c) (1/3, 1/3, 1/3);

**Correct**

(c) is true.

- By definition, the core of this game is formed by a triplet  $(x_1, x_2, x_3) \in R_+^3$  that satisfies:
    - $x_i + x_j \geq 2/3$  for  $i \neq j$
    - $x_1 + x_2 + x_3 \geq 1$
  - Then, the core is a singleton with  $(x_1, x_2, x_3) = (1/3, 1/3, 1/3)$ .
- ☐ d) None of the above.



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