TECHNISCHE UNIVERSITÄT DRESDEN

Computational Logic ∴ Group

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Algorithmic Game Theory

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Exercises 9

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Problem 1.
Describe advantages, disadvantages, and possible motivations for each of the strategies we discussed in the lecture for the repeated Prisoner's Dilemma.

Problem 2.
`OneTitForTwoConsecutiveTats` is the following strategy for the repeated Prisoner's Dilemma game: Cooperate in the first stage, and in subsequent stages, defect whenever the other player defected in the two previous stages.

The table below shows what `RandomCooperate(0.4)` might do in a finite repeated Prisoner's Dilemma game with seven stages. Complete the table with the other player's actions and both player's payoffs. Assume that $S = 0$, $P = 1$, $R = 3$, and $T = 5$.

Stage	1	2	3	4	5	6	7	Mean
`RandomCooperate(0.4)`'s Action	D	C	D	D	D	C	C	
`OneTitForTwoConsecutiveTats`'s Action								
`RandomCooperate(0.4)`'s Payoff								
`OneTitForTwoConsecutiveTats`'s Payoff								

Problem 3.
`AllCooperate` is the following strategy for the repeated Prisoner's Dilemma game: Cooperate in every stage.

Show that in the finite repeated Prisoner's Dilemma game with m stages, (`AllCooperate`, `AllCooperate`) is not a Nash equilibrium.

Problem 4.

Suppose there is a population of beetles that compete with each other for food. We assume that beetles come in two sizes: large and small, where the large beetles are more effective at claiming an above-average share of food when they come upon a food source. This is further illustrated in the following table:

(Beetle1,Beetle2)	Small	Large
Small	(5,5)	(1,8)
Large	(8,1)	(3,3)

Since the body size of a beetle is not chosen by the beetle itself, it is genetically hard-wired for each beetle to play one of those strategies through its whole lifetime. Find an evolutionarily stable strategy and one strategy that is not evolutionarily stable. Then, interpret your result.