Advanced Microeconomics

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Exercises 2

Exercise 1 *(For this exercise* `http://www.lutanho.net/play/hex.html` *may be useful.)*

a. *Play with an opponent two times a hex game: one time You do the first move and in the next game the opponent does.*

b. *Try to find the game such that it ends in a draw (i.e. no winner, no loser).*

Exercise 2 *This exercise deals with the tic-tac-toe game. For parts 1 and 2 You need an opponent. For parts 2 and 3 use the following notations for the cells:*

1	*2*	*3*
4	*5*	*6*
7	*8*	*9*

a. *Play the tic-tac-toe game* 5 *times.*

b. *Both players write a completely elaborated plan of play on a paper that explains how they want to play this game. Then they put both papers on the table and play the game using these strategies.*

c. *Now suppose You are player* 1*. Write a completely elaborated plan of play on a paper that guarantees You at least a draw.*

Exercise 3 *Consider the Hotelling bi-matrix game in the case* $n = 2$*. Determine the Nash equilibria of this game*

a. *Represent this game as* 3×3*-bi-matrix game with at the first row strategy* 0 *for player* 1*, at the second row strategy* 1 *for player* 1*, etc.*

b. *Determine the Nash equilibria, the strongly Pareto efficient strategy profiles and the weakly Pareto efficient strategy profiles.*

Short solutions.

Solution 1 b. This is impossible. (Proving this for an arbitrary board size is very difficult.)

Solution 2 c. First move: 5. For each next move, if it applies, move opposite to last own move (and then win), otherwise move clockwise beside last move of opponent and if this is not possible, then move anti-clockwise beside last move of opponent.

Solution 3 a.

$$\begin{pmatrix} 3/2;3/2 & 1;2 & 3/2;3/2 \\ 2;1 & 3/2;3/2 & 2;1 \\ 3/2;3/2 & 1;2 & 3/2;3/2 \end{pmatrix}.$$

b. There is a unique Nash equilibrium: the strategy profile $(1,1)$.
c. Each strategy profile is strongly Pareto efficient and weakly Pareto efficient.