

FSEM Homework Assignment 5

Show your work!

1. Interpret some real-world example (this can either be autobiographical or fictional) as a non-zero sum game. In other words, take some situation involving two people's interests, where each player has a finite number of options (strategies) available to them, and write a payoff matrix where you give numerical values to each outcome. Explain as well as you can your motivation for choosing the matrix that you did. Also, draw the movement diagram for your example, and tell me which of the locations in your payoff matrix are Nash equilibria or Pareto optimal outcomes.

2. For the nonzero-sum game with payoff matrix

$$(b) \quad \begin{array}{c|ccc} & A & B & C \\ \hline A & (5,0) & (2,2) & (1,0) \\ B & (4,1) & (0,1) & (2,2) \end{array}$$

- (i) Use the movement diagram to find pure-strategy Nash equilibria,
- (ii) draw the payoff polygon and highlight the Pareto optimal outcomes, and
- (iii) decide whether or not the game is solvable in the strict sense.

3. The following 2×2 nonzero-sum games each have at least one pure-strategy Nash equilibrium in which Rose does not receive her maximum payoff. Decide if any of the following strategic moves will get Rose her best achievable payoff: seizing the first move, making a threat to Colin and forcing Colin to make the first move, or making a promise to Colin and forcing Colin to make the first move. (Remember that, as we discussed in class, Rose won't be able to go for her BEST possible payoff if it coincides with Colin's WORST possible payoff.)

$$(a) \quad \begin{array}{c|cc} & A & B \\ \hline A & (-2,3) & (1,2) \\ B & (0,1) & (4,0) \end{array}$$
$$(b) \quad \begin{array}{c|cc} & A & B \\ \hline A & (2,3) & (4,2) \\ B & (1,1) & (0,5) \end{array}$$