Department of Mathematics

MTL 763 (Introduction to Game Theory)

Quiz 1

Time: 1 hour | Date: 20/08/2023 | Max. Marks: 15

Note: The exam is closed-book, and all the questions are compulsory.

1. (a) Consider a matrix game A, where

$$A = \begin{pmatrix} 5 & 8 & 3 & 1 & 6 \\ 4 & 2 & 6 & 3 & 5 \\ 2 & 4 & 6 & 4 & 1 \\ 1 & 3 & 2 & 5 & 3 \end{pmatrix}.$$

Show that (x, y), where $x = \left(\frac{6}{37}, \frac{20}{37}, 0, \frac{11}{37}\right)$ and $y = \left(\frac{14}{37}, \frac{4}{37}, 0, \frac{19}{37}, 0\right)$, is a saddle point equilibrium. What is the value of game?

(b) Consider a matrix game

$$A = \begin{pmatrix} 1 & 2 & \alpha \\ \alpha & 2 & 3 \\ 2 & -1 & 3 \end{pmatrix}.$$

Find value of the game and at least one saddle point equilibria for all values of α, where $\alpha \in (1, \infty)$.

(3+3 marks)

2. Find a saddle point equilibrium and value of the following matrix game A

$$A = \begin{pmatrix} 2 & -1 & 0 & 1 \\ -2 & 3 & 1 & 2 \\ 0 & \frac{3}{4} & \frac{1}{2} & 3 \end{pmatrix}.$$

(4 marks)

3. Player 2 chooses a number $j \in \{1, 2, 3, 4\}$, and player 1 tries to guess what number player 2 has chosen. If he guesses correctly and the number was j, he wins 2^j dollars from player 2. Otherwise there is no payoff.

- Set up the matrix A of this game.
- Find the value of the game and saddle point equilibrium.
- What will be the new saddle point equilibrium of A if we add a number 1 in all diagonal entries of A?
- What will be the saddle point equilibrium of A if we add a number 1 in all the entries of A?

(1+2+1+1 marks)

Good Luck !!