

Indian Institute of Technology Kanpur

Department of Mathematics and Statistics

MTH 636M: Game Theory

Quiz 3, Date: April 12, 2024, Friday

Timing: 06:15 PM to 07:30 PM

- Answer all the questions. The exam is for 20 marks.
- Try not to use any result not done in the class. However, if you use any such result, clearly state and prove it.
- Write your name, roll no., program name, and seat number clearly on the top of your answer sheet.
- For prove or disprove type questions, clearly state whether it's a prove or a disprove and then provide the arguments.
- One A4 sheet with ONLY necessary definitions and results are allowed during the exam. Use of a calculator, mobile, and smart watch is strictly prohibited.
- Be precise in writing the answers. Unnecessary arguments would lead to a deduction in marks.

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1. Find all the max-min strategies and the value of the following two-player zero sum game: **(5 marks)**

		Player 2	
		a	b
Player 1	A	1	1
	B	2	1

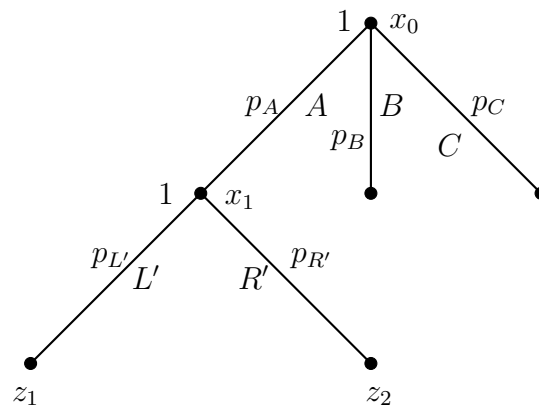
2. Prove or disprove: The value of the two-player zero-sum game given by the matrix A is 0. Then the value of the two-player zero-sum game given by the matrix $-A$ is also 0. **(5 marks)**
3. A two-player game $G = \langle \{1, 2\}, (S_i)_{i \in \{1, 2\}}, (u_i)_{i \in \{1, 2\}} \rangle$ is called symmetric if
 - (i) each player has the same set of strategies: $S_i = S_j$ for each $i, j \in N$, and
 - (ii) $u_i(s_i, s_j) = u_j(s_j, s_i)$ for all $i, j \in \{1, 2\}$.

Prove or disprove: In every two-player symmetric game there exists a symmetric equilibrium in mixed strategies: an equilibrium $\sigma = (\sigma_i)_{i \in \{1,2\}}$ satisfying $\sigma_1 = \sigma_2$ (**5 marks**)

4. Determine all the behavioral strategies that are outcome equivalent with the following mixed strategy

AL'	AR'	BL'	BR'	CL'	CR'
0.5	0	0.2	0.1	0.1	0.1

in the following one-player extensive form structure:



(5 marks)