Indian Institute of Technology Kanpur

Department of Mathematics and Statistics

MTH 636M: Game Theory

Quiz 3, Date: April 12, 2024, Friday

Timing: 04:00 PM to 05:15 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 Nash Equilibria of the following game: (**5 marks**)

		Player 2	
		a	b
Player 1	A	$(1,1)$	$(0,1)$
	B	$(0,1)$	$(2,1)$

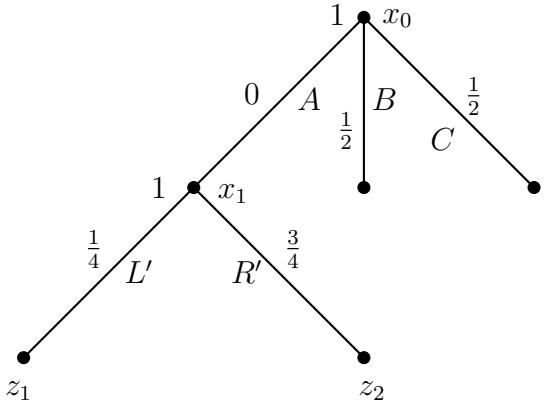
2. Establish whether there exists a two-player game in extensive form with perfect information, and possible outcomes I (Player I wins), II (Player II wins), and D (a draw), whose strategic-form description is

		Player II			
		s_{II}^1	s_{II}^2	s_{II}^3	s_{II}^4
Player I	s_{I}^1	D	I	II	I
	s_{I}^2	I	II	I	D
	s_{I}^3	I	I	II	II

If the answer is yes, describe the game. If not, explain why not. (**5 marks**)

3. Prove or disprove: There is a 2×2 game with infinitely many Nash Equilibria such that there exist two pure-strategy profiles s and s' with $u_i(s) \neq u_i(s')$ for some $i \in \{1, 2\}$ where u_i denotes the utility of Player i. (**5 marks**)

4. Determine all mixed strategies that are outcome equivalent with the behavioral strategy represented in the following one-player extensive form structure:



(**5 marks**)