

Microeconomic Theory II
Midterm Exam

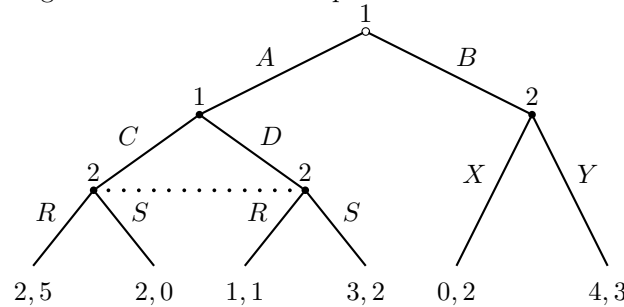
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Mikhael Shor

Question 1. Consider the following game.

		Player 2			
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Player 1	<i>M</i>	3, 8	1, 20	2, 1	2, 6
	<i>N</i>	5, 0	2, 1	1, 2	1, 1
	<i>O</i>	3, 5	3, 1	5, 3	8, 0
	<i>P</i>	2, 1	4, 5	4, 3	4, 100

- (a) What strategies are consistent with rationality? Carefully explain why each strategy is or is not.
- (b) What strategies survive the iterated deletion of strictly dominated strategies? For each iteration, specify the dominated strategy and a strategy that dominates it.
- (c) List all Nash equilibria of this game.
- (d) What are each player's expected equilibrium payoffs?
- (e) Imagine that the above (stage) game is repeated twice, with players observing the outcome of the first stage before playing in the second stage. Is there any subgame-perfect Nash equilibrium in which either player earns strictly more in the first period than the payoffs calculated above? Briefly explain.

Question 2. Consider the game below. Both the extensive form and the normal form are given. The dotted line represents an information set.



		Player 2			
		<i>R, X</i>	<i>R, Y</i>	<i>S, X</i>	<i>S, Y</i>
Player 1	<i>A, C</i>	2, 5	2, 5	2, 0	2, 0
	<i>A, D</i>	1, 1	1, 1	3, 2	3, 2
	<i>B, C</i>	0, 2	4, 3	0, 2	4, 3
	<i>B, D</i>	0, 2	4, 3	0, 2	4, 3

- List all pure-strategy Nash equilibria.
- Which pure-strategy Nash equilibria are trembling-hand perfect? Explain.
- List all pure-strategy Nash subgame-perfect equilibria.
- Consider the best Nash equilibrium from (a) for Player 2. Carefully explain why it is a Nash equilibrium but is not a subgame-perfect Nash equilibrium.

Question 3. The owner of a firm can invest in technology that improves the productivity of his two employees. The timing of the game is:

- The owner selects a level of technology, τ , at a cost of τ^3 , then
- Both employees, after observing τ , simultaneously select their effort levels $e_1 \geq 0$ and $e_2 \geq 0$ at a cost of $\frac{1}{4}e_i^2$.

The total revenue of the firm, as a function of τ, e_1, e_2 is given by:

$$R = \tau e_1 + \tau e_2 + e_1 e_2$$

The revenue of the firm is shared with the employees, with $\frac{1}{2}$ going to the owner and $\frac{1}{4}$ to each employee. Thus, the owner's profit is $\frac{1}{2}R - \tau^3$ and the utility of employee i is $\frac{1}{4}R - \frac{1}{4}e_i^2$, $i \in \{1, 2\}$.

- Determine the subgame-perfect Nash equilibrium of this game.
- * Imagine that the owner decides to share more revenue with the employees, with all three (the owner and the employees) receiving $\frac{1}{3}R$. Does the owner's profit in equilibrium increase or decrease? Demonstrate or explain.