Microeconomic Theory II — Spring 2026

Midterm Exam — Mikhael Shor

This exam consists of three questions. Partial credit requires evidence of your reasoning. Any question asking you to explain, demonstrate, or argue must include a written justification to receive credit.

Question 1. Consider the following normal-form game between Player 1 (rows; payoffs listed first) and Player 2 (columns):

		Player 2			
		A	B	C	D
Player 1	M	$3,3$	$7,2$	$3,7$	$1,1$
	N	$2,7$	$1,2$	$0,3$	$7,1$
	O	$7,1$	$3,6$	$7,1$	$3,6$
	P	$4,0$	$4,8$	$3,0$	$2,8$

(a) Apply iterated deletion of strictly dominated strategies (IDSDS). For each strategy deleted, clearly state which strategy dominates it. For each remaining strategy, demonstrate or explain why it is not strictly dominated.

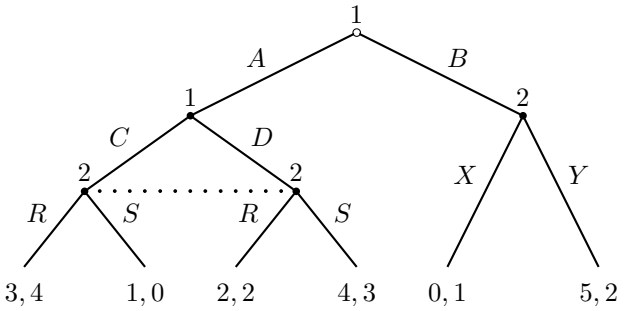
(b) Demonstrate or argue that the game does not have an equilibrium in which Player 1 plays N with positive probability.

(c) Find all Nash equilibria. Demonstrate that each is an equilibrium, and that no others exist.

(d) Suppose this game is repeated twice. Does there exist a subgame-perfect Nash equilibrium in which players play pure strategies in the first period? Explain.

(e) Suppose this game is infinitely repeated with common discount factor $\delta < 1$. Does there exist a subgame-perfect Nash equilibrium in which players play (N, A) on the equilibrium path? Carefully 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			
		R, X	R, Y	S, X	S, Y
Player 1	A, C	$3, 4$	$3, 4$	$1, 0$	$1, 0$
	A, D	$2, 2$	$2, 2$	$4, 3$	$4, 3$
	B, C	$0, 1$	$5, 2$	$0, 1$	$5, 2$
	B, D	$0, 1$	$5, 2$	$0, 1$	$5, 2$

(a) List all pure-strategy Nash equilibria.

(b) Which pure-strategy Nash equilibria are trembling-hand perfect? Explain.

(c) List all pure-strategy Nash subgame-perfect equilibria.

(d) 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.

(e) Imagine that the information set following actions C and D did not exist (i.e., the game is one of perfect information, with each information set containing a single node). Identify all subgame-perfect Nash equilibria of this modified game.

Question 3. The U.S. government is considering subsidies to support domestic investment in semiconductor research and development (R&D). First, the government chooses a government support level $g \geq 0$ at cost g^2. Next, the nation's two major semiconductor firms (1 and 2) observe g and simultaneously choose R&D investment levels $r_1, r_2 \geq 0$.

Firm i's profit (when the other firm is firm j) is:

$$\pi_i(g, r_i, r_j) = \sqrt{g + r_j}\,\sqrt{r_i} - r_i$$

The government's objective is to maximize total firm investment minus the cost of government support:

$$U_G = r_1 + r_2 - g^2$$

(a) What is the subgame-perfect Nash equilibrium?

(b) What is the government's equilibrium payoff?