Microeconomics III — Spring 2016

Midterm Exam — Mikhael Shor

Question 1. Consider the following game.

		Player 2			
		A	B	C	D
Player 1	M	$6, 1$	$0, 2$	$10, 0$	$0, 1$
	N	$0, 4$	$6, 2$	$0, 0$	$10, 1$
	O	$1, 0$	$1, 2$	$6, 3$	$6, 1$
	P	$0, 4$	$0, 0$	$0, 0$	$10, 1$

(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.

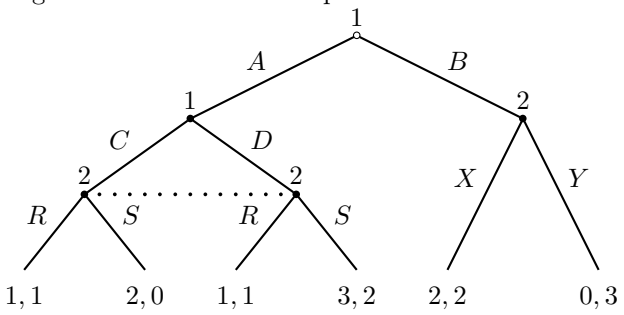
(c) What is the unique Nash equilibrium of this game?

(d) Is the above equilibrium trembling-hand perfect? Briefly explain.

(e) What are each player's expected equilibrium payoffs?

(f) 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			
		R, X	R, Y	S, X	S, Y
Player 1	A, C	$1, 1$	$1, 1$	$2, 0$	$2, 0$
	A, D	$1, 1$	$1, 1$	$3, 2$	$3, 2$
	B, C	$2, 2$	$0, 3$	$2, 2$	$0, 3$
	B, D	$2, 2$	$0, 3$	$2, 2$	$0, 3$

(a) List all pure-strategy Nash equilibria.

(b) List all pure-strategy subgame-perfect equilibria.

(c) Imagine now that player 2 can observe Player 1's choice of C or D (i.e., we delete the dotted line representing the information set). What is the subgame-perfect Nash equilibrium?

Question 3. Three students ($i = 1, 2, 3$) are working on a joint project. Each student selects the amount of time to work on the project, $x_i \geq 0$. The quality of the project, q, depends on x_1, x_2, and x_3:

$$q(x_1, x_2, x_3) = 3x_1 + 2x_2 + 2x_3 - x_1x_2 - x_1x_3$$

Each student also has a cost function given by

$$c_i(x_i) = (x_i)^2$$

The utility for student i is given by:

$$u_i(x_1, x_2, x_3) = q(x_1, x_2, x_3) - c_i(x_i)$$

(a) Suppose that the students simultaneously and independently decide how much time to spend on the project. Show each student's best response function and determine the pure-strategy Nash equilibrium of this game.

(b) Consider the following two-period game. First, student 1 decides how much time to spend on the project. Second, after observing the choice of student 1, students 2 and 3 simultaneously and independently decide how much time to spend. Determine the pure-strategy subgame-perfect Nash equilibrium of this game.