Microeconomics III — Spring 2013

Midterm Exam — Mikhael Shor

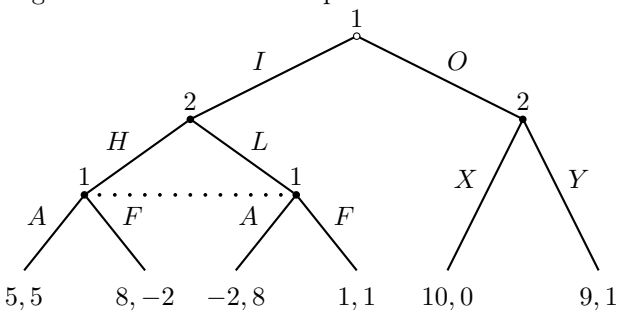
Question 1. Consider the normal form game below.

		Player 2			
		A	B	C	D
Player 1	M	$8,3$	$7,2$	$7,4$	$7,7$
	N	$7,3$	$6,6$	$4,4$	$9,3$
	O	$8,4$	$8,2$	$8,8$	$7,4$
	P	$6,6$	$4,4$	$3,4$	$8,6$

(a) What strategies are weakly dominated?

(b) What strategies survive the iterated deletion of strictly dominated strategies? Carefully explain each step.

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			
		H, X	H, Y	L, X	L, Y
Player 1	I, A	$5,5$	$5,5$	$-2,8$	$-2,8$
	I, F	$8,-2$	$8,-2$	$1,1$	$1,1$
	O, A	$10,0$	$9,1$	$10,0$	$9,1$
	O, F	$10,0$	$9,1$	$10,0$	$9,1$

(a) What strategies are rationalizable?

(b) List all pure-strategy Nash equilibria.

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

		Player 2	
		A	B
Player 1	X	$1+a, -1$	$-1, 1$
	Y	$-1, 1$	$1, -1$

Question 3. Consider the game above.

(a) Find the Nash equilibrium for $a \geq 0$.

(b) Consider a two-stage game where (i) player 1 chooses a at a cost of $a/16$ and then (ii) both players observe a and play the above simultnaeous-move game. Find the unique subgame perfect equilibrium.

(c) What is each player's expected payoff in the subgame perfect equilibrium? Does player 2's payoff change with a? Briefly explain intuitively why or why not.

Question 4. An industry consists of two symmetric firms, A and B, who are Cournot duopolists. Inverse demand is given by $P = 60 - q_A - q_B$, where q_A and q_B are the output decisions of firms A and B, respectively. Each firm has a constant marginal cost of 12. The revenue of firm $i \in \{A, B\}$ is given by Pq_i and the profit by $(P-12)q_i$.

Firm B is managed by its owner who selects q_B to maximize profit of Firm B.

Firm A has both an owner and a manager. The manager selects q_A. However, prior to the quantity competition stage, the owner of Firm A determines how to compensate the manager. The manager of Firm A selects q_A to maximize his income (given the contract chosen by his owner) and the owner of Firm A maximizes the firm's net income (profit minus manager compensation).

The game proceeds in two stages. In the first stage, the owner of Firm A announces either a profit-sharing or revenue-sharing contract for its manager. A profit-sharing contract gives the manager of firm A a fraction β of the profit of the firm while a revenue-sharing contract gives the manager a fraction β of the revenue of the firm. The fraction β, $0 < \beta < 1$, is fixed and exogenously given. Then, in the second stage, the managers simultaneously select q_A and q_B.

1. Find the Nash equilibrium of the second stage of this game under a profit-sharing contract for any β.

2. Find the Nash equilibrium of the second stage of this game under a revenue-sharing contract for any β.

3. Suppose that β is arbitrarily small. What is the subgame perfect Nash equilibrium of this game?

4. How does delegation impact the owner's profit? Briefly explain and provide some intuition.