

Your Name: _____

The Ohio State University
Department of Economics
Second Midterm Examination

Econ 5001
Fall 2016
Prof. James Peck

Directions: *Answer all questions, show all work, and label all figures.*

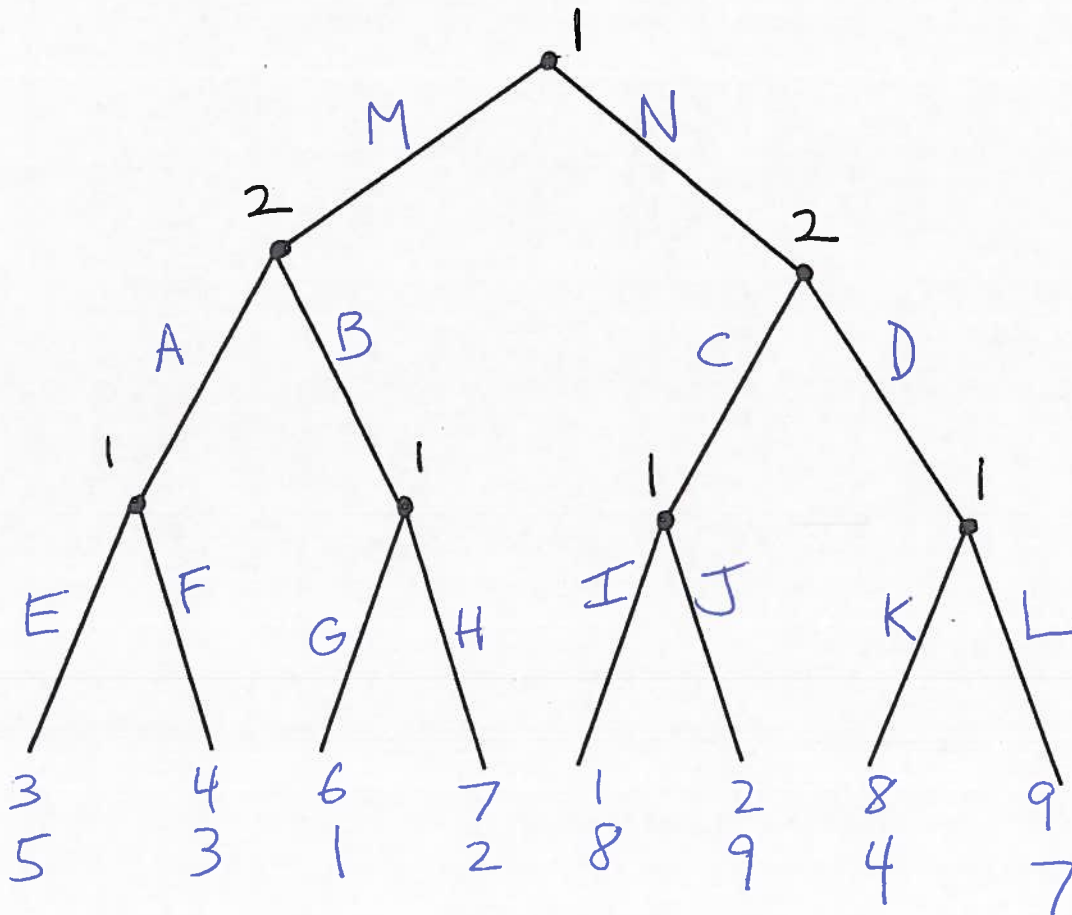
1. (25 points) In the following two player, zero sum game, player 1 chooses either the integer 3 or the integer -5 , and player 2 chooses either the integer -4 or the integer 1. Player 1's payoff is the product of the integers selected by each player, and player 2's payoff is the negative of the product of the integers selected by each player. That is, $S_1 = \{3, -5\}$, $S_2 = \{-4, 1\}$, $u_1(s_1, s_2) = s_1 s_2$, and $u_2(s_1, s_2) = -s_1 s_2$.

Find the mixed strategy Nash equilibrium of this game. You must show your work to get any credit.

2. (25 points) Consider the extensive form game shown below.

Solve for the subgame perfect Nash equilibrium using backward induction, and specify the equilibrium strategy profile here:

Note: remember to specify a full strategy profile, and not just a payoff or path through the game tree.



3. (25 points) Consider the repeated game in which the following stage game is played an infinite number of times. A player's payoff in the repeated game is the average of his/her payoffs across all the periods.

		player 2	
		J	K
player 1	M	3, 2	1, 0
	N	4, 1	1, 0

(a) (10 points) Find a Nash equilibrium of the infinitely repeated game in which the profile (M, J) is played in every period on the equilibrium path of the game. Remember to specify a complete strategy profile, and briefly explain your answer.

(b) (15 points) Find a subgame perfect Nash equilibrium of the infinitely repeated game in which the profile (M, J) is played in every period on the equilibrium path of the game. Remember to specify a complete strategy profile, and briefly explain your answer. [Note: if you choose, you can use the same strategy profile in your answer to parts (a) and (b).]

Hint: The "folk theorem" presented in class will not help for this problem. Think about "social norms" and punishment phases.

4. (25 points) Two firms are engaged in a Stackelberg game. First firm 1 chooses its quantity, q_1 . Then firm 2 observes firm 1's quantity before choosing its own quantity, q_2 . Firm 1 has a marginal production cost of 35 per unit, and firm 2 has production cost of zero. The market inverse demand function is given by

$$p = 150 - q_1 - q_2.$$

(a) (15 points) Solve this game for the subgame perfect Nash equilibrium. Remember to specify a complete strategy profile.

(b) (10 points) Find a Nash equilibrium of this game that is not subgame perfect, in which firm 1's quantity equals firm 2's quantity along the equilibrium path of the game. Remember to specify a complete strategy profile.