

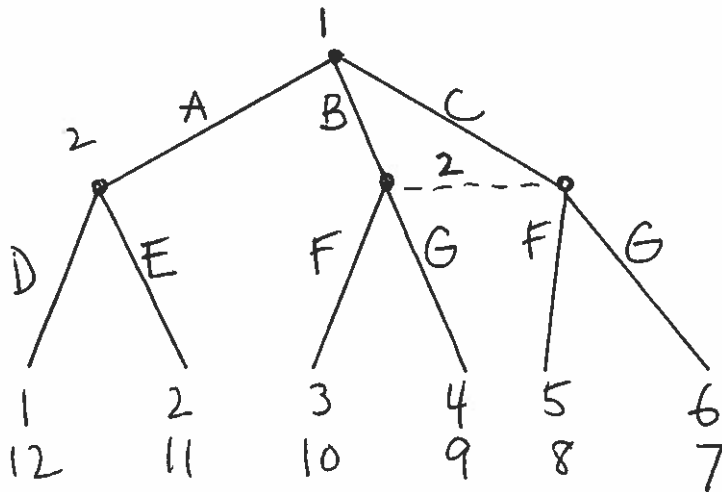
Your Name: _____

The Ohio State University
Department of Economics
First Midterm Examination

Econ 5001
Spring 2020
Prof. James Peck

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

1. (20 points) Convert the following extensive form game into normal form, by drawing the payoff matrix, labeling the strategies corresponding to the rows and columns, and filling in the payoffs.



2. (20 points) Consider the following game.

		player 2		
		a	b	c
player 1	w	5, 1	4, 6	5, 3
	x	2, 10	10, 2	3, 2
	y	4, 3	5, 7	4, 12

Find all of the values of p for which the corresponding mixed strategy for player 1, $\sigma_1 = (p, 1 - p, 0)$, dominates the strategy, y .

3. (20 points) Consider the following game with 8 players. Each player simultaneously decides whether to attend a dinner party (strategy A) or to not attend the dinner party (strategy N). Let M denote the number of players who decide to attend the dinner party. Any player who decides not to attend the dinner party receives a payoff of zero, so for all i , we have

$$u_i(s) = 0 \quad \text{if} \quad s_i = N.$$

The following information gives the payoff to each player who attends the dinner party:

- Player 7's payoff from attending is equal to the total number of attendees, M .
- Player 5's payoff from attending is 1 if player 2 attends, and is -1 if player 2 does not attend.
- Player 1's payoff from attending is -1 .
- Player 8's payoff from attending is $2M - 15$.
- Player 2's payoff from attending is 1 if player 5 attends, and is -1 if player 5 does not attend.
- Player 3's payoff from attending is 1 if player 8 does not attend, and is -1 if player 8 attends.
- For players 4 and 6, their payoff from attending is 1 if $M \geq 3$ (at least 3 attend), and is -1 if $M < 3$.

Find the set of rationalizable strategies for each player. Equivalently, iteratively eliminate dominated strategies until no more strategies can be eliminated, and report which strategies are left for each player.

4. (20 points) Consider the following game.

		player 2				
		P	Q	R	S	T
player 1	B	1, -4	3, 4	1, 5	4, 3	5, 1
	C	2, 5	1, -1	2, 2	0, 2	3, 4
	D	-2, 3	4, 2	4, 4	4, -5	3, 1
	E	4, 2	-5, 1	4, 5	0, 2	5, 3
	F	1, 1	2, 5	2, -4	1, 3	2, 3

(i) (15 points) Find all of the (pure strategy) Nash equilibria of this game, and report your answer here:

(ii) (5 points) Is the profile, (D, R) , efficient? Briefly explain your reasoning.

5. (20 points) Two firms are playing a game of Cournot (quantity) competition. Denoting the quantity chosen by firm 1 as q_1 and the quantity chosen by firm 2 as q_2 , the market price is given by the inverse demand equation

$$p = 420 - 3q_1 - 3q_2.$$

Each firm has a production cost of 60 per unit of output. Each firm's payoff is defined to be its profit.

(a) (15 points) Find the Nash equilibrium strategy profile, and show your work.

(b) (5 points) In the Nash equilibrium, what is the market price and what are the profits of each firm?