

# More Game theory questions

#1

Given the following static game

players: player 1, player 2

rules: player<sup>1</sup> can choose one of two actions (up or down), and player 2 can choose one of two actions (left or right)

Both players make their decision at the same time, and the game is only played once

payoff:  
matrix  
(in millions)

		player 2	
		left	right
player 1	up	4, 4	1, 5
	down	5, 1	2, 2

- Identify the dominant strategy equilibrium (if any)
- Identify the Nash equilibrium(s) (if any)

c) If the players could talk ahead of playing the game, could it result in a different outcome?

d) If the players could sign a contract ahead of time (where the contracts specify the strategy for each and the penalty if the contract is not respected) could it result in a different outcome

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For the remaining parts of this question assume that the game is repeated with no end in sight

e) provide a strategy for player 1

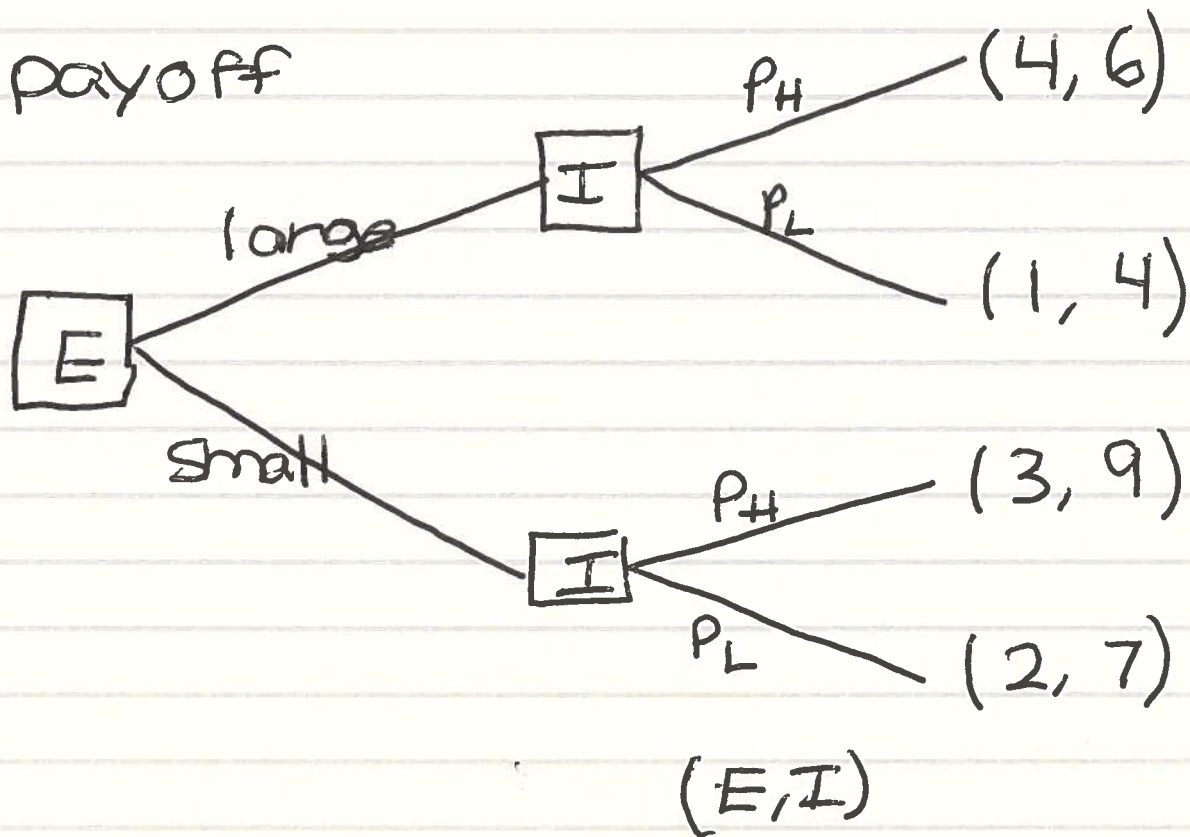
f) Is it possible that a different outcome will <sup>be</sup> observed in every period (as compared to what one would observe under the static game)

#2

Given the following dynamic game

players: Incumbent (I) and an entrant (E)

rules: The entrant (E) makes her decision first, she has two choices: to enter the industry on a large scale (large) or on a small scale (small). The Incumbent (I) must then decide whether to charge a high price ( $P_H$ ) or a low price ( $P_L$ )



a) provide to examples of strategies for each player

b) Is (small,  $P_L$   $\cup$  E chose large)  
(small,  $P_H$   $\cup$  E chose small)

a Nash-equilibrium set of strategies?

# Answers

## Answer to #1

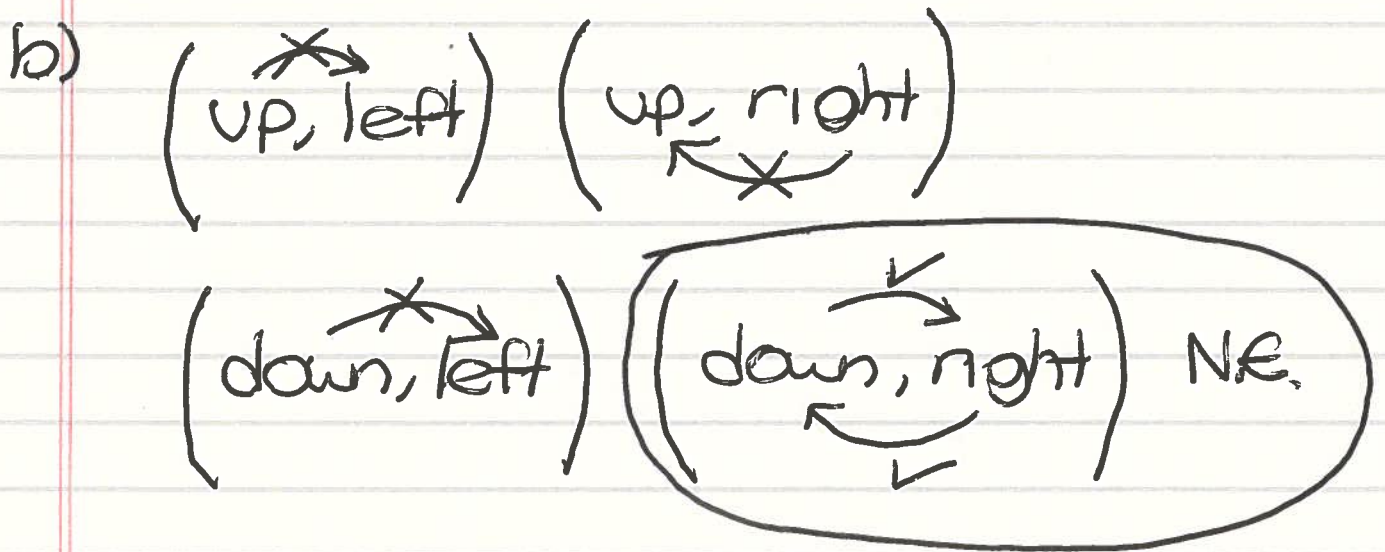
If player 1 chooses up  $\Rightarrow$  P2 chooses right  
If player 1 chooses down  $\Rightarrow$  P2 chooses right

} right is a dominant strategy for player 2

If player 2 chooses left  $\Rightarrow$  P1 chooses down  
If player 2 chooses right  $\Rightarrow$  P1 chooses down

} down is a dominant strategy for player 1

a) (down, right) is a dominant strategy equilibrium



c) No. Despite the fact that (up, left) generates a better outcome for both, they each have the incentive to move away from their respective strategy. Therefore talking ahead would not change anything

d) Maybe. If the contract said (up, left) and the penalty for breaking the contract exceeded 1 million, one would have (up, left). If the penalty was less than 1 million each player would have an incentive to break the contract

e) Player 1 chooses up every period

f) possible

P1 starts with up and keeps choosing up as long as the rival keeps choosing left. If the rival chooses right P1 chooses down in every subsequent period

P2 starts with left and keeps playing left as long as the rival keeps choosing up. If the rival chooses down P2 chooses right in every subsequent period

## Answer to #2

a)

- E chooses Large
- E chooses small
- I choose  $P_H$  if E chooses large  
I choose  $P_L$  if E chooses small
- I choose  $P_H$  if E chooses large  
I choose  $P_H$  if E chooses small

b)

