Game Theory: Assignment 2

Total points: 35 | Due Date: 07/10/2022

Contribution to grade: 10% (3xx); 7.5%(5xx) | Due time: 11:59 PM

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1. Find the mixed strategy Nash Equilibria (msNE) in the following game (7)

			Player 2	
			q Left	$1-q$ Right
Player 1	p_1	Up	3,2	1,4
	p_2	Middle	1,3	2,1
	$1-p_1-p_2$	Down	2,2	2,0

Hint: Just calculate expected payoffs like you would in a 2×2 game. It will work out.

2. Keeping in mind that you can also use mixed strategies to eliminate a pure strategy, eliminate at least one pure strategy from the following game. (3)

		Player 2		
		Left	Middle	Right
Player 1	Low	1,1	3,2	2,0
	Moderate	2,2	2,1.8	3,3.2
	High	3,1	1,1.2	2,0

3. In Cournot duopoly, we showed that if our rival chooses "Cartel", it made sense to defect to the competitive outcome. However, was the defection to the competitive outcome the optimal deviation? Or can a firm do even better by defecting to some third quantity? If yes, what is this quantity?(Don't ask for hints). (10)

4. In Bertrand, if payoff from not selling was $-c$, what would be the pure strategy NE (psNE)? (5)

5. An empty room is available in the hostel. There are two interest groups among the students, $i \in \{S, E\}$. S students want to fill the room up with sports equipment like TT tables, carrom boards etc., while E students want to fill it up with entertainment equipment like a TV, speakers, relaxing chairs etc. On a unit line, think of S's preferred policy as 0 and E's preferred policy as 1. The decision will be taken by the hostel student body, and will be based on monetary contributions made by each group. Groups simultaneously and independently choose a contribution to the student body $s_i \in [0, 1]$. The student body will eventually choose a policy

$$r(s_S, s_E) = \frac{1}{2} - s_S + s_E$$

Student groups have the following utility functions:

$$v_S(s_S, s_E) = -\left[r(s_S, s_E)\right]^2 - s_S$$

$$v_E(s_S, s_E) = -\left[1 - r(s_S, s_E)\right]^2 - s_E$$

Find the Nash equilibrium of this simultaneous-move game. (10)