

HS 224: Game Theory and Economics
B Tech, 4th Semester, Mid Semester Test
Total Marks: 40
Date: 3rd March, 2017

Provide adequate explanation in support of your arguments

1. Two people drive their cars directly at each other until one (or both) swerves off the road or they crash into each other. Payoffs: swerving while other does not: 0; both swerve: 5; neither swerves: -10; continuing on while the other swerves: 10.
 - (a) Construct the payoff matrix.
 - (b) Is this a zero-sum game?
 - (c) Is the game dominance solvable?
 - (d) Are there any Nash equilibria? If there are, find them. Are those equilibria symmetric? [1+1+2+3]
2. Rock-Paper-Scissors game: Each of two players shows either a rock, or a paper, or a scissors sign to the other player simultaneously. If both show the same sign none gets anything. In case of rock versus paper, the player showing rock loses one rupee, the player showing paper gets one rupee. If it is rock versus scissors, rock gets one rupee, scissors loses one rupee. If it is paper versus scissors, paper loses one rupee, scissors get one rupee. Formulate this as a strategic game and find the Nash equilibrium (or equilibria). [2+4]
3. Consider the following game where two firms are deciding prices. Which of the actions are rationalisable and which are not for each of the players? Explain. Find the Nash equilibria of the game, if they exist. [6+1]

		Firm 2		
		High	Medium	Low
Firm 1	High	6,6	0,10	0,8
	Medium	10,0	5,5	0,8
	Low	8,0	8,0	4,4

4. Consider a variant of the example of Cournot duopoly game discussed in the class. Firm 1 chooses its output to maximise its market share subject to not making a loss, rather than to maximise its profit. Find the Nash equilibrium. What happens if both firms maximise their market shares? (there is a linear demand function and constant unit cost) [4+3]
5. Two candidates *A* and *B* are fighting an election. There are an *odd* number of citizens, each of which may vote for either *A* or *B*. The candidate who gets the majority number of votes wins. Abstention is not possible, voting for both the candidates is not possible. A majority of citizens prefer *A* to win. The citizens are the players in this game. They are indifferent between all action profiles in which a majority of players vote for *A*. Similarly they are indifferent between profiles in which a majority of players vote for *B*. Some

players (majority) prefer an action profile of the first type to one of the second type, and the others have the reverse preference. Find all the Nash equilibria of the game. [7]

6. Consider the variant of the example of Bertrand's duopoly discussed in the class. Each firm is restricted to choose a price that is an integral number of paise. Take the monetary unit to be a paisa, and assume that c is an integer and $\alpha > c + 1$. Is (c, c) a Nash equilibrium of this game? Is there any other Nash equilibrium? [4+2]