Eco 311/511: Game Theory
Assignment

October 30, 2024

Instructions: You can attempt the assignment in groups of maximum 2 students. Mention the names and roll numbers of all the group members in your submission. Answer all questions. Maximum marks: 25

1. Three indivisible objects A,B,C need to be assigned to three agents 1,2,3. Each agent needs to be assigned a unique object. Each agent has a strict preference ordering over the set of objects and each object yields a payoff greater than 0 for each agent. The agents play the following allocation game: first, agent 1 goes and selects an object from the three objects. Second, agent 2 goes and selects an object from the remaining two objects. Finally, agent 3 gets the remaining object. (4+3+5)

    (a) Write down the strategic game clearly specifying the strategies of the players.

    (b) Does the game have a pure strategy Nash equilibrium? If yes, find it. If no, explain why.

    (c) Suppose at the end of the game, each player is asked to state whether he is happy with his allocation or wants to exchange it with another player. If any player individually says that he wants to exchange, then none of the players receive any object and instead get 0 payoff. Find out the new pure strategy Nash equilibrium, if any. If there is no pure strategy Nash equilibrium, explain why.

2. Consider a market for used cars consisting of one buyer and one seller. Suppose the seller has exactly one car. The car is either of high quality (H) or low quality (L). Both the buyer and seller value a high quality car more than a bad quality car- the value of a high quality car to the seller and buyer is s_H and b_H respectively, and that of a low quality car is s_L and b_L where $s_H, s_L, b_H, b_L > 0$. The quality is known only to the seller, while the buyer starts out with the belief that a car is high quality with probability 0.4, and is of bad quality with probability 0.6. Write down a strategic game modeling this market and comment on the equilibria outcomes- which quality cars will be sold/unsold under different conditions? (8)

3. Suppose (σ_1, σ_2) and (σ_1', σ_2') are two MSNE in a zero-sum game. Show that (σ_1, σ_2') and (σ_1', σ_2) are also MSNE for the same game. (5)