Lab - Week 8

Games in Normal Form

The purpose of this exercise is to ensure that you can formulate simple 2-player games formally, ie. that you can cast a natural language description into utilities and that you understand expected utilities.

1. Problem 1

Two rivaling sports teams want to go out after the competition. They are in a small remote town with only two restaurants: a good one and a mediocre one. Of course, everyone would prefer to go to the good one. The trouble is that the teams really dislike each other and they do not want to dine in the same restaurant. A team visiting the good restaurant will get 10 units of enjoyment from the dinner, and a team visiting the mediocre one only 4 units. If both teams visit the same restaurant, the enjoyment will be reduced by 50% for each team.

Tasks

1. Define the utility for each of the teams depending on their decisions.
2. Can you identify any choices that one of the teams should never make? If so, give reasons why the team should never make that choice.
3. Assuming that Team 1 visits both restaurants with equal probability and that Team 2 visits the good one with p=0.9, determine the expected utility for each team.

2. Problem 2

Two people traveling together have bought the exact same type of watch on a holiday but the suitcase with both watches has been stolen. Both apply to their separate insurances for reimbursement. What they do not know is that the insurance managers know each other and know that they bought identical watches, paying the same price. As a simplification, they can only claim $2000, $3000, $4000 or $5000, whichever is the closest to the value they paid.

(a) If both claim the same amount, they will receive the claimed amount from the insurance.
(b) If one of them overclaims (claims too much), only the lesser amount will be paid out. The person overclaiming will also have to pay a $2000 fine, whereas the other person will receive a $2000 reward for honesty.

1. Define the utility for both players depending on their decisions.

3. Problem 3

Two people go to the zoo and watch a pair of lions. They bet whether the lions will fight or stay peaceful. If neither of them is right or both are right, there is a draw (and no money is paid out). If one of them predicts the behavior correctly and the other one is wrong, the loser has to pay $100 to the winner.

1. Explain why the above problem cannot be formulated as a 2-player game in the form introduced in the seminar.

2. Assuming that lions are fighting with p=0.75, determine the expected utility for each player depending on their strategies.