Introduction to Game Theory for Law and Philosophy Students
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Problem Set 9 (Extensive Games III)

1. Bargaining with three players

Assume that an agreement on how to divide a unit between three players is conditional on the consent of all three. Assume that player 1 starts by making an offer and then the other two players, one after the other, accept or reject the offer.

Show that the game has a unique subgame perfect equilibrium outcome in which player 1 gets the whole unit.

2. Alternating Offers with equal costs

Consider the alternating offers bargaining model with a pie of size 1 and equal bargaining cost $c > 0$. Show that every partition of the pie which gives player 1 at least c is an outcome of some subgame perfect equlibirum.

3. Communication

Consider a situation in which a group $\{1, 2, .., n\}$, living in separate locations, need to share information which will be received initially only by player 1. Assume that this information is beneficial only if all of the players receive it (for example, the group is a number of related families, the document is a map with instructions on how to get to a family gathering and god forbid if one of the families doesn't make it).

When a player receives the information, he is informed of the path the information took from player 1 to him. Then he has to decide whether to pass the information on to one of the players who has not yet received it or to simply stop the process. The agents are better off (payoff of 1) if and only if the information is received by all the members of the group. A "small" cost of $c > 0$ is associated with the effort to transfer the information to the next player.

(1) Draw the game tree for the case of $n = 4$.

(2) Characterize the subgame perfect equlibria of the game (for any n).

(3) Would the conclusion in (2) be different if the players had to decide simultaneously to whom they intend to send the document?