University of Warwick, Department of Economics — Spring 2014
EC941: Game Theory — Prof. Francesco Squintani

Problem Set 3

Exercise 1. Consider a variation of the battle of the sexes game in which player 2 may like or dislike meeting player 1, and this is private information. Further, suppose that player 1 prefers to meet player 2 if only if reciprocated by her, otherwise player 1 prefers to be alone.

a. Model the situation as a Bayesian game.

b. Find all the pure and mixed strategy Bayesian Nash Equilibria of this game.

Exercise 3. Two people are involved in a dispute. Person 1 does not know whether person 2 is strong or weak; she assigns probability α to person 2's being strong. Person 2 is fully informed. Each person can either fight or yield. Each person's preferences are represented by the expected value of a Bernoulli payoff function that assigns the payoff of 0 if she yields (regardless of the other person's action) and a payoff of 1 if she fights and her opponent yields; if both people fight then their payoffs are $(-1, 1)$ if person 2 is strong and $(1, -1)$ if person 2 is weak.

a. Formulate this situation as a Bayesian game.

b. Find all Nash equilibria of this game if $\alpha < 1/2$ and if $\alpha > 1/2$.

Exercise 3. Each of two individuals receives a ticket on which there is an integer from 1 to m indicating the size of a prize she may receive. The individuals' tickets are assigned randomly and independently; the probability of an individual's receiving each possible number is positive. Each individual is given the option to exchange her prize for the other individual's prize; the individuals are given this option simultaneously. If both individuals wish to exchange then the prizes are exchanged; otherwise each individual receives her own prize. Each individual's objective is to maximize her expected monetary payoff.

a. Model this situation as a Bayesian game.

b. Show that in any Nash equilibrium of this game, the highest prize that either individual is willing to exchange is the smallest possible prize.