Game Theory, Spring 2024

Problem Set # 1

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Exercise 1

Consider the following Bayesian game:

θ_1^1

	L	M	R
T	$3,2$	$3,0$	$3,3$
B	$6,6$	$0,0$	$0,9$

θ_1^2

	L	M	R
T	$3,2$	$3,3$	$3,0$
B	$6,6$	$0,9$	$0,0$

Player 1 has complete information about the payoffs, and Player 2 has incomplete information about the payoffs. Suppose that the types of Player 1 are equally likely. Find all the Bayesian Nash equilibria of this game (in pure *and* mixed strategies).

Exercise 2

Consider the following Bayesian game:

	θ_2^1				θ_2^2	
	L	R			L	R
T	$5,5$	$1,7$		T	$5,3$	$1,1$
B	$7,1$	$3,3$		B	$1,1$	$3,5$

Player 2 has complete information about the payoffs, and Player 1 has incomplete information about the payoffs. Suppose that the types of Player 2 are equally likely. Find all the Bayesian Nash equilibria of this game (in pure *and* mixed strategies).

Exercise 3

Consider the following strategic situation. Player 2 can be *strong* (with probability α) or *weak* (with probability $1-\alpha$). Player 1 does not know whether player 2 is strong or weak. Player 2 has complete information about her own strength. Each player can *fight* or *yield*. A player has the payoff of 0 if she yields, and has the payoff of 2 if she fights and the other player yields. If both players fight and player 2 is strong, then player 1 obtains the payoff of -2 and player 2 obtains the payoff of 2. If both players fight and player 2 is weak, then player 1 obtains the payoff of 2 and player 2 obtains the payoff of -2. Formally define this strategic situation as a Bayesian game and find all the Bayesian Nash equilibria of this game (in pure *and* mixed strategies) for different values of $\alpha \in (0, 1)$.