Prof. Dr. Anke Gerber

Advanced Game Theory

2. Exam Summer Term 2015

Important Instructions

1. You have 90 minutes to finish the exam.
2. The maximum number of points is 90.
3. You are not allowed to use any material (books, lecture notes etc.), but you may use a non-programmable calculator.
4. Give a reason for your answers. You may end up with zero points for a question if it is not clear how you arrived at your solution.
5. Only use the paper that is handed out to you and submit all paper in the end (including any notes you do not want to be graded).
6. Please do not use a pencil.
7. Please write your name on each sheet of paper, number the pages and leave a margin (2.5cm) on each page.
8. Please write legibly and make sure that your answers are coherent and complete.
9. Mobile phones must be switched off throughout the exam.

Good luck!

Problem 1 **(35 Points)**

Consider the following two-player normal form game:

Player 2

		A	B	C
	A	$2,2$	$0,2$	$3,0$
Player 1	B	$2,0$	$1,1$	$1,0$
	C	$0,3$	$0,1$	$0,0$

1. Determine all Nash equilibria (pure and mixed) of the game.

   (15 Points)

2. Determine all evolutionary stable strategies under symmetric role behavior, i.e. when players cannot condition their strategy on the player role.

   (20 Points)

Problem 2 (30 Points)

Consider the following two-player normal form game:

		Player 2	
		A	B
Player 1	A	$2, 0$	$0, 1$
	B	$0, 4$	$1, 3$

1. Determine all Nash equilibria (pure and mixed) and the players' equilibrium payoffs.

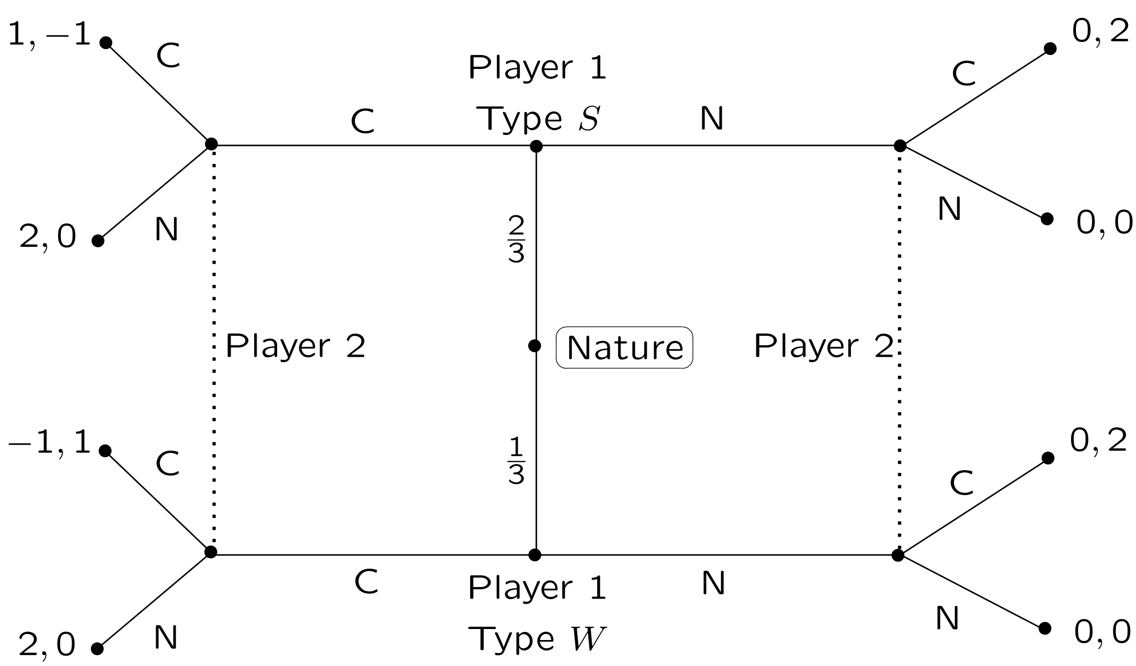
   (15 Points)

2. Determine the players' maxminimization strategies and their maxminimized payoffs.

   (15 Points)

Problem 3 **(25 Points)**

Consider the following extensive game with imperfect information: There are two players who have to decide whether to compete for a prize. Player 1 can be of two types: with probability $\frac{2}{3}$ player 1 is strong (S) and with probability $\frac{1}{3}$ player 1 is weak (W). The type of player 1 is randomly determined by nature and only observed by player 1. After observing his type player 1 decides whether to compete (C) or not compete (N) for the prize. Player 2 observes player 1's decision (but not player 1's type) and then decides whether to compete (C) or not compete (N) for the prize.
The following game tree shows the players' utilities depending on the type of player 1 and the actions chosen by both players. The first number at a terminal node is the utility of player 1 and the second number is the utility of player 2.



1. Argue why there does not exist a weak perfect Bayesian equilibrium where player 1 chooses different actions depending on his type, i.e. where player 1's strategy is such that either he plays C if he is type S and N if he is type W, or he plays N if he is type S and C if he is type W.

   (10 Points)

2. Determine a weak perfect Bayesian equilibrium where player 1 always chooses C independent of his type.

   (15 Points)