MICROECONOMICS II.I – PROBLEM SET 1

New York University, a.y. 2012-2013

1. Exercise 1

Part A

Find the normal form of the extensive form game in Figure 1. Write it down as a *bimatrix*, i.e. a matrix whose entries contain payoff pairs $(u_1(s), u_2(s))$.

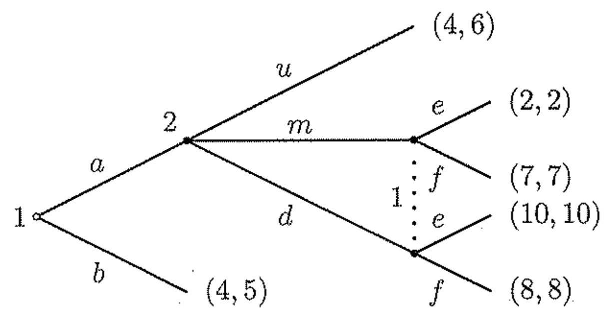

Figure 1.— An Extensive Form Game.

Part B

Find an extensive form game with **perfect information** having the normal form shown below.

P2

P1		
	$5, 5$	$8, 8$
	$1, 1$	$1, 1$
	$5, 5$	$6, 6$
	$1, 1$	$1, 1$
	$5, 5$	$0, 0$
	$1, 1$	$1, 1$

Figure 2.— Normal Form of game Γ.

Due by Feb 11th, 7pm in my mailbox. Next office-hour is on Thu, 6.30-7.30pm. Please email me (jacopo.perego@nyu.edu), if you plan to come.

Question 2

For the next items, refer to the EFG Γ_1 below.

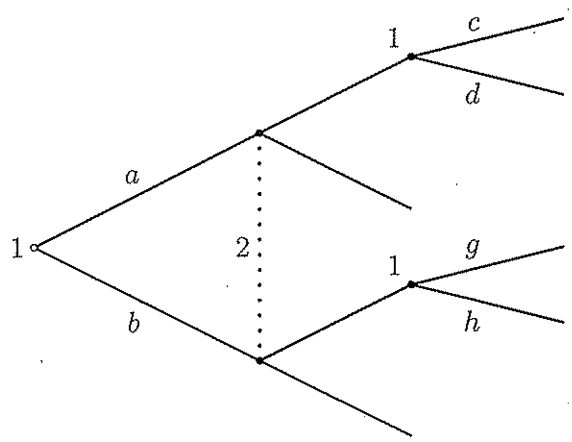

Figure 3.— Tree representation of Γ_1.

Part A

Find a mixed strategy for Player 1 that is equivalent in the sense of Kuhn's Theorem to the behavioral strategy that chooses a with probability 0.4, c with probability 0.6 (conditional on being reached) and g with probability 0.1 (conditional on being reached). Is it unique?

Part B

Find a behavioral strategy that is equivalent to the mixed strategy for Player 1 that assigns probability weights 0.5 on (a, c, g), 0.2 on (b, c, g), 0.2 on (b, d, g) and 0.1 on (b, d, h). Is it unique?

Question 3

Ten ferocious old pirates are dividing their plunder (100 gold coins) before disbanding. No single coin can be subdivided. According to pirate code, pirate number 1 $P1$ suggests a sharing rule (for instance if $P1$ suggests $(55, 0, 9, 0, 9, 0, 9, 0, 9, 9)$ he is suggesting that $P1$ gets 55 coins, $P2$ gets 0, $P3$ gets 9 and so on...). All ten pirates vote by roll call on the proposal. If a majority (even a tie is enough) accept, then the division is carried out and the game ends. If the suggestion is not accepted then the first pirate is thrown overboard (which is worse than getting no gold, because of the circling sharks) and $P2$ makes a proposal, which is subjected to majority vote, and so on. These pirates are crafty enough to perform backward induction, and so cranky that whenever a pirate is indifferent about voting for or against a proposal he votes against. Explain what happens and why.

Question 4 (Optional, not graded)

Find all equilibria (in pure or mixed strategies) of the following game.

		P2		
		R	P	S
	R	$0, 0$	$0, 1$	$1, 0$
$P1$	P	$1, 0$	$0, 0$	$0, 1$
	S	$0, 1$	$1, 0$	$0, 0$

Figure 4.— Rock-paper-scissor game.