Klausur/Exam – Microeconomic Analysis (20024) – WS 2011/2012

- **Prüfer/Examiner: Manfred Jäger-Ambrożewicz, 01 Exam on Microeconomic Analysis, 2012-02-11**
- **No aids are allowed but a pocket calculator according to the rules of the examination office and a bilingual dictionary.**
- **The exam has 8 questions on 2 pages. 7 questions have to be answered. You have to choose whether you answer question 7 or 8. If you answer both, only the answer to question 7 will be taken into account. Please clearly state which question (7 or 8) you are answering. Your time budget is 120 minutes.**
- **When answering the questions you must provide explanations, intermediate steps and explicit verifications!**

Question 1 (12 min / 10 points): Consider the following game with two players called Row and Column. Row has three strategies: T,M,B and Column also has three strategies: L,C,R. The table 1 displays the payoffs.
a.) What strategies survive **iterated elimination of strictly dominated stategies**? **At each step of elimination you have to provide the justification for elimination!**
b.) What are the **pure**-strategy Nash equilibria (NE)? **It is necessary to provide a complete reasoning why a profile is or is not a NE!**

Table 1

	L	C	R
T	2,0	1,1	4,2
M	3,4	1,2	2,3
B	1,3	0,2	3,0

Question 2 (12 min / 10 points): Consider the normal form game with two players called Row and Column with payoffs as displayed in table 2.
a.) Is there are **pure**-strategy Nash equilibrium? **Provide a complete verification!**
b.) Find the **mixed**-strategy Nash equilibrium. **It is necessary to provide all intermediate steps.**
c.) Suppose that just one of the payoffs of Row changes slightly by e.g. 0.05. What can you say about the probabilities you calculated in b.). Don't redo the calculations! Which probability does or does not change and why?

Table 2

	L	R
T	2,1	0,2
B	1,2	3,0

Question 3 (15 min / 12.5 points): Player 1 and player 2 are bargaining over how to split a dollar. Both players simultaneously name shares s_1 and s_2 ($0 \leq s_1, s_2 \leq 1$) they would like to have. If $s_1 + s_2 \leq 1$, then the players receive the shares they named; if $s_1 + s_2 > 1$, then both players receive zero.
a.) Are there strictly dominated strategies?
b.) Are there weakly dominated strategies?
c.) What are the pure-strategy Nash-equilibria of this game?
d.) There is one equilibrium that is – taking "culture" or "fairness" into account – of special interest (in addition of being "fair"!). Which one and why?

Question 4 (15 min / 12.5 points): Consider the normal-form game with payoffs in table 3.
a.) The profile (T,L) **is attractiv** (in a **specific game theoretic sense**)! **What** can you say about (T,L)?
b.) Argue – on the basis of a specific argument developed in the lecture – why (T,L) **might not be the outcome** of the game. Calculate the related critical "confidence level" (a probability / we calculated this probability for similar game in the lecture) that at the margin "supports" the equilibrium.

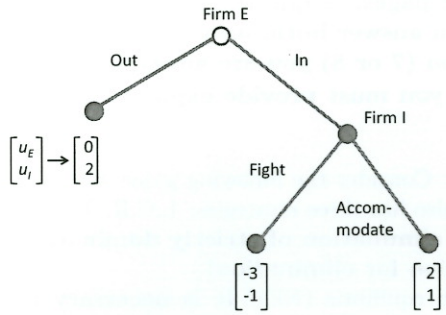
Table 3

	L	R
T	100, 100	-10, 0
B	70 , 0	50, 50

Question 5 (15 min / 12.5 points): Consider the extensive form game as displayed in figure 1.
a.) This game has two Nash equilibria (NEs). Please name these equilibria and verify that they are NE.

b.) One of the NEs – which one? – has a property that makes this equilibrium less reasonable than the other NE. Explain this property and explain why a solution taking this property not into account is not very confincing.

Figure 1



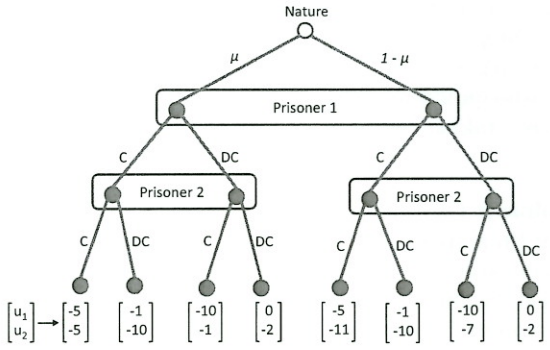
Question 6 (21 min / 17.5 points): According to Coase a monopolist who supplies a **durable good** faces a specific **strategic delimma. Explain this dilemma!** Refer to the two periods model with profits (don't derive these formulae but use them as a basis for your argument)

$$\begin{aligned}\pi_2 &= (1 - x_1 - x_2)x_2, \\ \pi_1 &= (1 - x_1 + \delta(1 - x_1 - x_2))x_1 + \delta(1 - x_1 - x_2)x_2 \\ &= x_1 - x_1^2 + \delta x_1 - \delta x_1^2 - \delta x_1 x_2 + \delta x_2 - \delta x_1 x_2 - \delta x_2^2,\end{aligned}$$

where x_1 and x_2 refer to the supplies in period 1 resp. period 2.
Hint: Focus on First Order Conditions and ignore the Second Order Conditions. Remember, that in one case the Kuhn-Tucker-Condition implies a **boundary solution**. It is not necessary to verify this mathematically but you must provide an explanation of the importance of this aspect of the solution. In order to **explain the dilemma** it is not necessary to solve **all** relevant optimization problems but to explain the problem with **one** optimization problem.

Question 7 (30 min / 25 points): Consider the following extensive form game (Figure 2).
a.) Concerning the **information structure** this game differs from the game say in questions 1. **Explain the difference**! Why do we use an "artificial" player **nature** in this game?
b.) Provide a definition of **pure strategy Bayesian Nash equilibrium**.
c.) Calculate the **pure strategy Bayesian Nash equilibrium**. **Provide a complete reasoning why the pure strategy Bayesian Nash equilibrium is actually a pure strategy Bayesian Nash equilibrium.**

Figure 2



Question 8 (30 min / 25 points): Consider a **duopoly** where both firms have equal marginal costs $0 < c < 1$ (and this is common knowledge). Demand is

$$X(p) = \max\{1 - p, 0\}.$$

Calculate the **Cournot (C)**, the **Bertrand (B)** and the **Stackelberg (S)** solutions (prices p^i, quantities x_1^i, x_2^i, $i = C, B, S$).