Written Exam for the B.Sc. in Economics autumn 2011-2012

Microeconomics C

Final Exam

February 22, 2012

(2-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students’ self-service system.

PLEASE ANSWER ALL QUESTIONS.
PLEASE EXPLAIN YOUR ANSWERS.

1. (a) Find all pure and mixed Nash equilibria in the following game:

	t_1	t_2
s_1	$5, 0$	$10, 1$
s_2	$7, 1$	$9, 0$

(b) Consider the following two stage game with two players (1 and 2). In the second stage, the players play one of the following two games (player 1 chooses U or D, player 2 chooses L or R):

Game A:

	L	R
U	$3, 1$	$0, 0$
D	$0, 0$	$1, 3$

Game B:

	L	R
U	$2, 2$	$7, 0$
D	$0, 6$	$5, 5$

In the first stage, player 1 chooses among the actions A and B. If he chooses A then the players play Game A in stage two. If he chooses B then they play Game B in stage two. Player 2 observes the choice of player 1 before stage two.

i. Draw a game tree representing the two stage game.
ii. Is it a game of perfect or imperfect information? How many subgames are there in the game (excluding the game itself)?
iii. What are the strategies for the two players?
iv. Find all pure strategy subgame perfect Nash equilibria.

2. Two profit maximizing firms (1 and 2) sell differentiated goods. The firms set their prices (p_1 and p_2) simultaneously and independently. The demand function facing firm i is:

$$q_i(p_i, p_j) = a + b \cdot (p_j - p_i),$$

where $a, b > 0$ are constants (do not worry about negative demand in this exercise). The marginal cost for firm i is $c_i \in (0, \frac{a}{b})$. There are no fixed costs.

(a) Write down the profit functions for the two firms. Find the best response functions. Comment on the role of b.

(b) Assume the two firms have identical marginal costs:

$$c_1 = c_2 = c.$$

Find the Nash equilibrium [*hint:* the equilibrium is symmetric, the two firms set the same price]. How does the equilibrium price depend on b? Give an intuitive explanation.

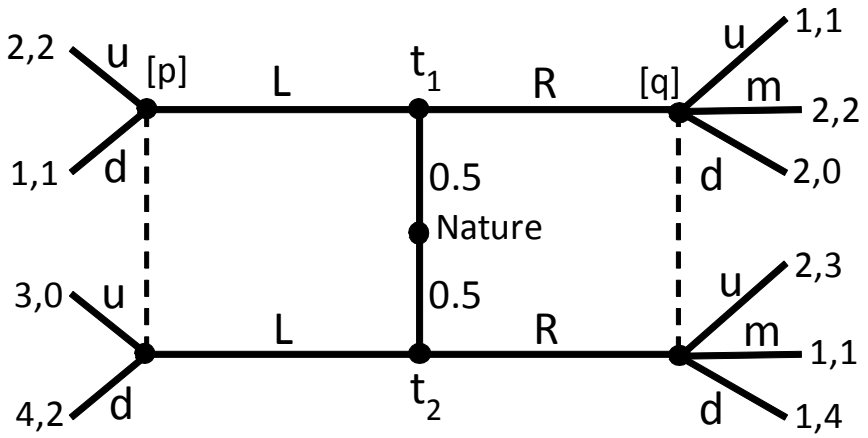
(c) Find the Nash equilibrium when the firms do not have identical marginal costs.

(d) Suppose the marginal cost of firm j increases. What is the impact on the equilibrium price of firm i? Give an intuitive explanantion.

For the final question, let $a = b = 2$ and $c_1 = c_2 = 1$.

(e) Suppose the game between the two firms is repeated over an infinite time horizon $t = 1, 2, ..., \infty$. The discount factor is $\delta \in (0, 1)$ and each firm maximizes the sum of discounted profits. In this infinitely repeated game, specify trigger strategies such that the prices in all stages are $p_1 = p_2 = 4$. Find the smallest value of δ such that the trigger strategies constitute a subgame perfect Nash equilibrium.

3. Consider the following signalling game:



(a) Are any of the messages (L or R) dominated for type t_1? Are any of the messages dominated for type t_2?

(b) Find a separating perfect Bayesian equilibrium.

(c) Find a pooling perfect Bayesian equilibrium. Does it satisfy Signalling Requirement 5 from Gibbons? Does it satisfy Signalling Requirement 6?