4109H: Game Theory, FALL 2005

Homework 2

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This homework is due on Thursday, October 6 at 4pm in class. Notice that the points for 5 problems sum up to 115. However, this is still OUT OF 100. So if you do everything perfectly you can get 115%. Scores more than 100% WILL count for your final grade.

1. (20 points) Gibbons 2.4
2. (25 points) Gibbons 2.5
3. (15 points) Gibbons 2.6
4. (20 points) Gibbons 2.7
5. (35 points) **Entry Game**. Consider the market for soft drinks and two firms: Pepsi and Coke. Suppose that the inverse demand is given by $P = a - Q$, where Q is total quantity produced. The cost of producing q units is cq for both firms.

   Suppose that at the beginning Pepsi is an incumbent (the only firm on the market) and Coke is a potential entrant. There are three decisions that are made in this game: 1) Coke decides on whether to *enter* the market or *not*; 2) Pepsi decides on whether to be *tough* or to *accommodate*; 3) Coke decides on whether to be *tough* or to *accommodate*. Suppose that if Coke enters it incurs the cost of E

dollars. If Coke does not enter then Pepsi gets its monopoly profits. For Pepsi: 1) being tough means that it precommits to producing the monopoly quantity whatever Coke is doing and 2) be accommodating means that Pepsi precommits to producing Cournot quantity (with 2 firms) whatever Coke is doing. For Coke: 1) being tough means to precommit to monopoly quantity whatever Pepsi is doing and 2) be accommodating means to precommit to Cournot quantity.

Suppose that timing and information structure are like this: 1) Coke decides whether to enter or not. If Coke does not enter game ends; 2) Pepsi DOES NOT observe Coke's choice and decides whether to be tough or accommodate; 3) If Coke has entered, it decides whether to be tough or accommodate, however Coke DOES NOT observe Pepsi's choice at the previous stage.

Write down the extensive form of this game. Making any assumptions on the values of any parameters find Subgame-Perfect Nash Equilibrium of this game. Try to change the value of some parameter so that different SPNE emerges. Give an economic intuition why SPNE changes.