

## Midterm Exam, Econ 100C, Spring 2009

Answer any three of the four questions

**Question 1.** In a community of 1000 people there are 600 type A people whose native language is Language A and 400 type B people with native language B. Everyone is able to speak and understand his or her native language. A native speaker of Language A can learn language B at cost  $\$C_A$ . A native speaker of Language B can learn language A at cost  $\$C_B$ . The value to anyone of being able to speak to and understand another person is \$1 per person.

**Part a)** For what values of  $C_A$  and  $C_B$  would there be a Nash equilibrium in which nobody learned the other group's language? Explain your answer.

**Part b)** An outcome is said to be socially efficient if it maximizes total benefits minus total costs. For what values of  $C_A$  and  $C_B$  would it be socially efficient for type A's to learn language B? Explain why this could be socially efficient even if it is a Nash equilibrium for nobody to learn a second language.

**Part c)** For what values of  $C_A$  and  $C_B$ , would there be an equilibrium in which the type A's learned language B and the type B's did not learn language A. Explain your answer.

**Part d)** For what values of  $C_A$  and  $C_B$ , would there be a Nash equilibrium in which the type B's learned language A and the type A's did not learn language B.

**Part e)** Another community has 3 linguistic groups, Type A's who speak language A, Type B's who speak language B and Type C's who speak language C. There are 600 Type A's, 200 Type B's and 200 Type C's. Everybody has the same cost  $c$  of learning any language other than his or her native tongue. The benefits of being able to speak to and understand any other person in the community is \$1 per person. For what values of  $c$  would it be true that there is a Nash equilibrium in which nobody learns any language other than their native tongue, but also another Nash equilibrium in which the type B's and type C's learn language A.

### Question 2.

**Part a)** Describe Professor Paul David's account of the development and marketing of the modern typewriter in "Clio and the Economics of QWERTY." Why was the QWERTY keyboard layout chosen? What point(s) do you think Professor David is trying to make in this discussion?

**Part b)** How is Professor David's story of QWERTY related to the presence of network externalities? What network externalities could there be with typewriters?

**Part c)** What do Professors Liebowitz and Margolis have to say about the QWERTY standard in their paper "The Fable of the Keys?" What point(s) are they trying to make in this discussion?

**Question 3.** MegaSoft has a copyright on a piece of software. The price at which it can sell  $X$  copies of its software is given by the inverse demand function:

$$P = 1000 - X.$$

The marginal cost of producing an additional copy of this software is zero, but for each unit that it sells, the company has to pay royalties to two separate patent holders A and B, each of which holds a patent to an idea that is used in the software. The royalty rate charged by company A is  $r_A$  per unit sold and the royalty charged by company B is  $r_B$  per unit sold. When the company sells  $X$  copies of its software, it must therefore pay a total of  $(r_A + r_B)X$  in royalties.

**Part a)** Solve for the profit-maximizing price and quantity for MegaSoft. (The answer will be a function of the variables  $r_A$  and  $r_B$ .)

**Part b)** Patent holders A and B both know the answer to the problem you solved in Part a. Each patent holder believes that the royalty rate that he charges does not affect the royalty rate charged by the other patent holder, but does affect the price of Megasoft's software as found in Part a. What royalty rate should each of them charge to maximize his profits.

**Part c)** Megasoft decides to buy out companies A and B so that it no longer needs to pay royalties. What price will Megasoft now charge for its software? How many units will it sell? How much would it be willing to pay for the two companies?

**Part d)** Suppose that Megasoft buys only one of the two companies and the other continues to charge royalties. Find the royalty rate that the remaining patent holder, the price that Megasoft would charge for its software. How much would Megasoft be willing to pay for just one of the patent holders.

**Question 4.** Discuss the arguments made by Boldrin and Levine against copyright and/or patents in the following industries. In what ways are intellectual property issues different and in what ways are they similar among these industries. (A good discussion will include a description of current regulation, some historical information, and some analysis of efficient distribution of the final product and of incentives to develop new products.)

- a) music
- b) software development
- c) pharmaceuticals