

EC 11. MIDTERM EXAM

Due 1.00 PM Friday April 29, 2005

INSTRUCTIONS:

You have 3 hours to do this exam. It must be handed in by 1.00 PM FRIDAY APRIL 29. You may return the exam at the end of lectures, or to your TA on Friday, or in the box outside my office. The exam is OPEN BOOK, which means the text book class notes and homeworks. Do not use other books. The Honor code applies. Do not consult with other students about the exam. The exam will count for 30% of your grade. There are four questions amounting to 100 points. The point value of each question is shown at the end of the question. If you cannot fully answer a question partial credit will be given. Please read the whole exam before starting a question.

If you have any questions please e-mail your TA or me at wilkie@hss.

[1] (a) What is the Definition of a Nash Equilibrium of a game? (5)

(b) Consider the following game. Two firms compete by choosing quantities q_1 and q_2 . Demand is given by $p = a - b(q_1 + q_2)$. Suppose that each firm has a constant marginal cost of production so that the cost functions are; $C_1(q_1) = c_1 \cdot q_1$ and $C_2(q_2) = c_2 \cdot q_2$. We assume that $c_1 > c_2$. Write down firm 1's profit function. (5)

(c) Derive firm 1's Reaction function (also called a best response function). (5)

(d) Compute the Nash Equilibrium quantities and the equilibrium price. [Hint: Trying graphing the reaction functions.] (10)

[2] The market demand for albums by "boy bands" is given by the equation: $Q_d = I/\sqrt{p}$. Where I is the total teenage consumers' income. Suppose that there are 10 identical firms (that is, boy bands) in the industry. Each band/firm has the total cost function $C(q) = 128/3 + (1/3)q^3$ of churning out albums. Assume that the market is "perfectly competitive" so that each firm takes price as a constant.

(a) Derive the supply curve for each firm and for the industry. (5)

(b) Graph the supply and demand curves for $I = 1000$ and solve for the equilibrium quantity and price. (5)

(c) What is the level of a firm's profit. (5)

(d) Calculate minimum average cost. What is the long run equilibrium price and quantity sold in this market for $I = 1000$ if we allow for fractional firms. (5)

(e) Suppose that the government, in the interest of good taste, imposes a strict licensing requirement and only 10 bands are allowed to operate in the market. What is the social cost or deadweight loss of this policy. [This one is bit subtle.] (5)

vspace8mm

[3] Consider the following utility function, $u(x, y) = x^{1/3}y^{2/3}$.

(a) Graph the indifference curves for $u(x, y) = 1$ and $u(x, y) = 2$. (5)

(b) Let p_x be the price of x , p_y be the price of y and her income be M . Derive the consumer's demand curve for x . (10)

(c) What is the consumer's optimum choice with a budget where prices are $p_x = 2$ and $p_y = 1$ and her income is 100. (5)

[4] Consider an industry where a firm has the following cost function: $C(q) = 10 + 2q$, and demand is given by $q^d = 10 - p$.

a) Graph the demand function, average cost and marginal cost. (1)

b) Is there a competitive (price taking) equilibrium in this market? If so what is the equilibrium, if not why not? (5)

c) Suppose that there is only one firm what is the monopoly price? What is the monopolist's profit? (5)

d) What is the size of the "deadweight loss" or social cost of the monopoly. (7)

e) If you were very wise regulator with the power to enforce price controls and happened to know the true cost function C , what price would you set to maximize welfare subject to the firm not making a loss. (7)