Econ 303 - Intermediate Microeconomic Theory
College of William and Mary May 5, 2014
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Final Exam

You have until 3:30pm to complete the exam, be certain to use your time wisely. Answer all questions directly on the exam. You must show all of your work to receive full credit. Calculators may be used although you may leave answers as fractions. Unless a problem says otherwise, you can assume that firms can use fractions of units of inputs and produce fractions of units of output. You may also assume that consumers can buy and consume fractions of units of goods. Remember to put your name on the exam. Good luck!

Name:

1. (15 points) Suppose that a cable company has to invest a large amount in fiberoptic cables to set up Williamsburg for cable. The size of this investment is independent of how many cable subscribers the company actually has. Once the fiberoptic cables are set up, each additional customer adds $10 to the company's total costs regardless of how many customers are currently subscribing to cable. Demand for cable decreases as price increases, falling by a constant number of customers for each additional dollar in price (so the demand curve is linear). On a graph with number of cable customers on the horizontal axis, graph the following items:

   (a) The average total cost curve and marginal cost curve for the cable company.

   (b) The profits the cable company will make if allowed to act as a monopolist but not allowed to price discriminate.

   (c) The profits the cable company will make if forced to serve the efficient number of customers.

   (d) The price at which the cable company would break even.

   Be certain to clearly label all components of your graph. Also clearly note whether profits are positive or negative for parts (b) and (c).

2. (25 points) Suppose that you can enter the local DVD rental business by either opening a store or by setting up a kiosk (like Redbox). The total costs of running a DVD store are given by:

$$C_S(D) = D^2 + 2D \tag{1}$$

where D is the number of DVDs rented. The total costs of running a kiosk are given by:

$$C_K(D) = 2D^2 + D \tag{2}$$

where once again D is the number of DVDs rented. Demand for DVDs in Williamsburg is given by the following inverse demand function:

$$p(D) = 5 - \frac{1}{100}D \tag{3}$$

where $p(D)$ is the price of a DVD rental and D is the number of rentals.

(a) Find expressions for the average total costs ($AC_S(D)$), average variable costs ($AVC_S(D)$), and marginal costs ($MC_S(D)$) of running a store and the average total costs ($AC_K(D)$), average variable costs ($AVC_K(D)$), and marginal costs ($MC_K(D)$) of running a kiosk.

(b) Assuming that the DVD rental market is highly competitive and firms can enter and leave easily, which type of rental service will exist in the long run, stores or kiosks? Be certain to fully justify your answer.

(c) What will the long run equilibrium price of a DVD rental be and how many DVDs will be rented in the long run?

(d) Suppose that Williamsburg imposes a \$1 quantity tax on DVD rentals. Once this tax is in place, what will the long run quantity of DVD rentals be, what price will consumers pay for a rental and what price will firms receive for a rental?

3. (25 points) There are two bookstores in Williamsburg. Bookstore A has no fixed costs and constant marginal costs of \$5 per book. Bookstore B also has no fixed costs and but has higher marginal costs of \$6 per book due to a bad distribution deal with the publishing company. Demand for books in Williamsburg is given by:

$$D(p) = 100 - 10p \tag{4}$$

The two bookstores set their orders for books at the beginning of each month. The market price for books in Williamsburg that month is then determined by the total number of books supplied by the two bookstores combined.

(a) Write down an equation giving the profits for bookstore A as a function of the number of books it orders (B_A) and the number of books bookstore B orders (B_B).

(b) Find an expression for bookstore A's marginal revenue as a function of B_A and B_B. Explain why this marginal revenue function is decreasing as B_A increasing.

(c) Suppose that bookstore B orders 20 books. What is the profit-maximizing number of books for firm A to order?

(d) Suppose that bookstore A orders 20 books. What is the profit-maximizing number of books for firm B to order?

(e) At what quantity of B_B would bookstore A decide to order no books at all? Why would you not expect to see this happen? In other words, why should it never be the case the bookstore B sells books but bookstore A does not? Make certain your answer takes into consideration the best response functions of the two firms.

4. (20 points) The College plants flowers on campus to attract prospective students. For every additional flower planted, the College gains $100 in expected profits from future students. Current students also benefit from the flowers because they look nice. The marginal benefit current students get from additional flowers decreases as the number of flowers increases since the students start to get desensitized to the beauty of the flowers. The College does not care about the marginal benefits to current students since current students are already committed to paying their tuition. Suppose that the marginal costs to the college of planting flowers are given by:

$$MC(F) = 5F \tag{5}$$

where F is the current number of flowers planted.

   (a) On a graph with number of flowers on the horizontal axis, show the marginal costs to the College of planting flowers, the marginal benefits to the College of planting flowers, and the social marginal benefits of planting flowers.

   (b) On your graph, show the quantity of flowers that the College will decide to plant.

   (c) On your graph, show the socially efficient quantity of flowers.

   (d) The City of Williamsburg wants to get the college to plant the socially efficient quantity of flowers. The City plans to offer a subsidy to the college per flower planted. On your graph, show the size of the subsidy per flower the City should offer and the total amount the City will have to pay in subsidies.

   (e) If the subsidy above is implemented, will total surplus increase or decrease? Be certain to fully explain your answer and consider all relevant components of total surplus.

5. (15 points) There is only one berry farm in the Hampton Roads area so the farmer can act as a monopolist. The total costs of growing and distributing B baskets of berries are:

$$C(B) = 10 + B^2 \tag{6}$$

The inverse demand curve for berries is given by:

$$p(B) = 60 - \frac{1}{2}B \tag{7}$$

where $p(B)$ is the price per basket a customer is willing to pay for B baskets of berries.

(a) Suppose that the farmer decides to set a single price per basket. What would the profit-maximizing price be and what profits would the farmer make?

(b) Now suppose that the farmer instead decides to sell berries through a membership plan. Customers must pay a one-time membership fee of M and can then buy as many baskets as they want at a price p. What are the profit-maximizing membership fee and price per basket? What will the farmer's total profits be?

(c) Now the farmer decides to offer both plans, the membership plan from part (b) (at the membership fee and price per basket you found in part (b)) and the non-membership approach (no fee and the price per basket you found in part (a)). Which plan will the customer take? Be certain to fully justify your answer.