

Economics 200: 2st midterm

Name: _____

Student no.: _____

Answer all questions. Each question is worth 10 points.

1. Firm A has two sources for its output. (i) It can buy as much output as it wants at \$10 per unit. (ii) It can build a plant for a fixed cost of \$150. Then the plant can produce q units of output at a variable cost of $5q$. Marginal cost of q is 5. Average variable cost is 5.

(a) Assume firm A has built the plant. If firm A contracts to supply 20 units of output, how many units should it produce at the plant and how much should it buy? (5)

(b) If the plant has not yet been built, how much should the firm supply from the plant and how much should it buy? (5)

(a) The marginal cost of production is 5 and buying is 10. So it should produce all 20 units.

(b) To produce 20 units, the firm must build the plant and then produce for a total cost of $150+100 = 250$. It can buy 20 units for 200. So it should buy all the units.

2. Let the total demand for cars in Canada be $Q = 20 - p$ where p is the price of a car and Q is total output.

There are 10 domestic car factories. A domestic car factory can produce q cars at a total cost of q^2 . Marginal cost of q is $2q$. Average cost is q .

Cars may be imported and exported at the world price of 10 per car.

(a) What will be the equilibrium price of cars in Canada? Explain your answer. (5)

(b) Will cars be imported into Canada or exported from Canada? (5)

(a) Equilibrium price of cars in Canada is 10. If it is lower than 10, the firms will export the cars. If it is higher, the foreign firms will charge in and drive the price down.

(b) Equating price to marginal cost, each firm will produce

$$2q = 10 \tag{1}$$

$$q = 5 \tag{2}$$

Total supply by producers is 50.

At price equal to 10, Canadians will demand

$$Q = 20 - 10 = 10 \tag{3}$$

So 10 are sold at home and $50 - 10 = 40$ are sold abroad.

3. Let the total demand for college be $Q = 20 - p$ where p is the price of attending college and Q is total industry output.

There is a fixed cost of 4 to run a college. A college can produce q units of output at a variable cost of q^2 . Marginal cost of q is $2q$. Average variable cost is q .

(a) Let the short run price of attending college be p . How much output will a college produce in the short run? What is its short run profits? (3)

(b) In the short run, there are 10 existing colleges that act competitively. Find the equilibrium short run price. (3)

(c) If the government subsidizes the colleges by paying them \$1 per unit of output, how many colleges will there be in the long run? (4)

(a) Equating marginal cost to price

$$2q^* = p \quad (4)$$

$$q^* = \frac{p}{2} \quad (5)$$

Short run profits are

$$\pi = pq^* - (q^*)^2 = \frac{p^2}{2} - \left(\frac{p}{2}\right)^2 = \frac{p^2}{4} \quad (6)$$

(b) Industry output is $10\frac{p}{2}$. So equilibrium price is:

$$10\frac{p^*}{2} = 20 - p^* \quad (7)$$

$$p^* = \frac{10}{3} \quad (8)$$

(c) Equating marginal cost to new revenue per student

$$2q = p + 1 \quad (9)$$

$$\hat{q} = \frac{1+p}{2} \quad (10)$$

Long run profits are

$$\hat{\pi} = \frac{(1+p)^2}{4} - 4 \quad (11)$$

With free entry, $\hat{\pi} = 0$ which implies

$$\frac{(1+\hat{p})^2}{4} - 4 = 0 \quad (12)$$

$$\hat{p} = 3 \quad (13)$$

$$\hat{q} = 2 \quad (14)$$

Let \hat{n} be long run number of firms. Total industry output is $2\hat{n}$. Equating industry output with a equilibrium price of 3 gives:

$$2\hat{n} = 20 - 3 \quad (15)$$

$$\hat{n} = \frac{20-3}{2} \quad (16)$$

If you dont want \hat{n} to be a fraction, then the number of colleges will be 8. These 8 colleges will make money. But if a ninth entered, they will all lose money. So the ninth college will not enter.

4. The federal election campaign has begun. You are a local campaign organizer. You have \$150 to spend on advertising. You can choose between spending on mailing brochures or distributing flyers. Let x be spent on mail and $y = 150 - x$ on flyers. The votes your candidate expects to get is

$$V = x\sqrt{y} \tag{17}$$

The marginal product of x is \sqrt{y} .

The marginal product of y is $\frac{x}{2\sqrt{y}}$.

Your objective is to maximize the number of votes that your candidate will get.

(a) In the last campaign, you spent \$86 on mail and \$64 on flyers. Your manager suggests that you spend \$69 on mail and \$81 on flyers. Will this suggestion increase the expected number of votes? (3)

(b) What is the optimal expenditure on mailing brochures? (4)

(c) If the manager gives you twice as much money, will the total number of votes double, more than double or less than double? (3)

(a) Marginal product of x is

$$\sqrt{64} = 8 \tag{18}$$

Marginal product of y is

$$\frac{86}{2\sqrt{64}} = \frac{43}{8} < 8 \tag{19}$$

So you want to reduce y . Suggestion will decrease votes.

(b) Optimality implies equating marginal products:

$$\frac{150 - y^*}{2\sqrt{y^*}} = \sqrt{y^*} \tag{20}$$

$$150 - y^* = 2y^* \tag{21}$$

$$y^* = 50 \tag{22}$$

$$x^* = 100 \tag{23}$$

(c) It will more than double. There is increasing returns.

5. The ministry of agriculture in BC and the poultry industry are worried about the spread of avian flu to BC. After consulting the industry, the BC ministry of agriculture publicly announces that it will order all chicken in BC to be destroyed if and when avian flu spreads to the domestic flock. The ministry estimates that a one month ban on chicken production will eradicate the disease.

Since most chicken currently sold in BC is produced within the province, the premier of BC is worried about a shortage of chicken if there is an order to destroy the domestic flock.

(a) Should the ministry of agriculture start buying and stockpiling frozen chicken in anticipation of the potential arrival of avian flu?

(b) If the ministry announces the order to destroy the domestic flock, should it also impose a price freeze on chicken and or should it impose a limit on sale to two chicken per customer at the supermarket?

Write a memo to the premier giving your views on the above questions. 5 points for content and 5 points for grammar.

First, there are many substitutes for chicken including other meats, fish and vegetables. Based on previous food scares such as chicken flu in Asia, BSE in England, the impact of the disease is to reduce demand for the product. It may be the case that the fall in demand will still be lower than the usual out of province supply. In this case, the price of chicken will rise.

There are many substitutes for chicken which means that the demand elasticity is very large. The price cannot rise much. There is no reason to impose a price freeze or ration chicken because the increase in the price will increase out of province supply.

Finally, there is no reason for the ministry to stock up on chicken because it does not own any facility. It is vastly more efficient to inform consumers to stock up using their own freezers as they see fit.

In the worse case, one month without chicken for those consumers who are caught unprepared is not a big deal.