

Economics 200Y: 2nd Mid Term

Name: _____

Student number: _____

2 hours.
All aids allowed.
Answer all questions.
Explain your answers.
Each question is worth 10 points.

Name: _____

1. The market demand for cigarettes sold by the pack is $P = 100 - 0.1Q$ where P is the market price and Q is the total amount sold in the market. The market supply of cigarettes is $P = 0.1Q$.

(a) Find the equilibrium price of cigarettes and quantity sold. (3)

The government decides to charge producers a tax of 10 per pack of cigarettes sold.

(b) Find the equilibrium price of cigarettes paid by consumers and quantity sold. (3)

(c) Find the deadweight loss to society imposed by this tax. (2)

(d) Is your calculation of deadweight loss equal to the true social cost of the tax? (2)

(a) Demand equals supply:

$$100 - 0.1Q^* = 0.1Q^*$$

$$Q^* = 500$$

$$P^* = 50$$

(b) Let new equilibrium price be \hat{P} and quantity be \hat{Q} . Suppliers receive $\hat{P} - 10$ per pack. Then demand equals supply:

$$100 - 0.1\hat{Q} = 0.1\hat{Q} + 10$$

$$\hat{Q} = 450$$

$$\hat{P} = 55$$

(c) Deadweight loss calculation is standard.

(d) Not if cigarettes cause health problems which are subsidized by national health insurance.

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2. The market demand for food is $P = 100 - 0.1Q$ where Q is the total supply of food to the market.

There is a perfectly elastic supply of potential farmers, each of whom has a total cost curve of food production of $C(q) = q^2$ where q is the quantity of food produced by a farmer. The marginal cost curve of food production for each farmer is $MC(q) = 2q$. If a potential farmer does not enter farming, he can go to town and earn an income of 1 working in a factory.

(a) If the equilibrium price of food is P , how much should food should a farmer produce? (3)

(b) If the equilibrium price of food is P , what is a farmer's profit from farming? (2)

(c) What is the equilibrium price of food P such that a potential farmer is indifferent between being a farmer or working in town? (2)

(d) What is the equilibrium number of farmers in this society? (3)

(a)

$$MC = P$$

$$2q^* = P, q^* = \frac{P}{2}$$

(b)

$$\begin{aligned}\pi(P) &= Pq^* - C(q^*) \\ &= \frac{P^2}{2} - \frac{P^2}{4} = \frac{P^2}{4}\end{aligned}$$

(c) Indifference imply equal income in both occupations

$$\begin{aligned}\frac{P^2}{4} &= 1 \\ P &= 2\end{aligned}$$

(d) When $P = 2$, from demand curve

$$Q = \frac{(100 - 2)}{0.1} = 980$$

Number of farmers is

$$n = \frac{980}{q^*} = \frac{980}{1} = 980$$

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3. Jill can hire bike couriers at a wage of \$10 per courier to work for her delivery company. With n couriers, she can deliver $100\sqrt{n}$ packages. The marginal product of a courier is $\frac{50}{\sqrt{n}}$. Jill can charge \$1 per package for delivery.

- (a) What is the marginal revenue product of a courier?
- (b) What is the marginal cost of a courier?
- (c) How many couriers should she hire?
- (c) What is her total cost for delivering q packages?

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4. To make his fruit pies, Jack has to pay 50 cents an orange and \$1 an apple. Let a and o be the number of apples and oranges respectively. Jack's fruit pie production function, $f(a, o)$, is:

$$f(a, o) = a\sqrt{o}$$

His marginal product of apples is \sqrt{o} . His marginal product of oranges is $\frac{a}{2\sqrt{o}}$.

- (a) If Jack has to make 8 fruit pies, how many apples will he buy? (4)
 - (b) If Jack makes 8 pies, what is his average cost per pie? (2)
 - (c) If Jack has to make 16 fruit pies, how many apples will he buy? (2)
 - (d) Does Jack have a decreasing, constant or increasing returns to scale production function for making pies? (2)
- (a) Equating marginal rate of substitution and prices of inputs:

$$\frac{\sqrt{o}}{\frac{a}{2\sqrt{o}}} = \frac{1}{0.5}$$
$$a = o$$

He should use

$$8 = a^{\frac{3}{2}}$$
$$a = 4$$

(b) average cost is

$$\frac{4 * 1 + 4 * 0.5}{8} = 0.75$$

(c) He should buy

$$16 = a^{\frac{3}{2}}$$
$$a = 16^{\frac{2}{3}} < 8$$

(d) He has increasing returns because he is using less than double the amount of inputs for 16 pies compared with 8 pies.

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5. (a) Your textbook assumes that in general firms should maximize profits. Why would different shareholders (owners) with different utility functions agree that the firm should maximize profits? (3)

(b) Air Canada is bankrupt but continues to operate. Kimberly argues that Air Canada continues to operate because the federal government is unwilling to let Air Canada's creditors sell off its assets and shut the company down. Is her argument correct? (3)

(c) After a bad harvest due to poor weather, farmers lobby the government and they will receive some government subsidies to compensate for their crop losses. Do these government subsidies in bad times increase the long run average income of farmers? (4)

(a) If each shareholder's utility function is not a function of the firm's output decisions, then each shareholder's utility is only affected through the firm's effect on shareholder's wealth. And since a higher profit implies larger wealth and bigger budget for each shareholder, every shareholder will want to maximize profit.

(b) No. Entry is restricted in all international routes and Air Canada is guaranteed half the routes. So Air Canada can make positive economic profits if it pays market prices for inputs. Air Canada is bankrupt because it pays many of its workers (primarily) pilots more than the market wage due to past union contracts. The airline continues to operate because it is better for the airline to keep operating and for the creditors to renegotiate a division of the positive economic profits rather than to shut the company down and lose the positive economic profits. The unions will get less rents when the firm emerges from bankruptcy.

(c) If farmers anticipate that they will be partially covered for crop losses, this insurance will lead to more entry of farmers which means that the price of farm products in good years will be lower than before. So long run average incomes will remain the same or fall if farmers are risk averse because there will be less variation in yearly incomes.

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6. Before mad cow disease affected the Canadian cattle industry, 80% of Canadian beef were sold abroad and 20% were consumed at home. The world wholesale price of beef was 60 cents per pound. Canadian producers could choose to sell beef at home or abroad. Assume that there is no transportation cost for selling beef abroad. After the disease hit, all beef had to be sold at home. The wholesale price at home falls to 20 cents per pound. Assume that the short run supply is perfectly inelastic.

(a) What is the elasticity of demand for wholesale Canadian beef in Canada?

(b) Canadian beef processors and supermarkets buy cattle, slaughter, clean, repackage it into different cuts, and put it on the supermarket shelves. Assume this industry acts competitively. The retail price of Canadian beef in Canadian supermarkets fell from \$1 per pound to 80 cents. Assume all beef is sold. What is the retail demand elasticity for Canadian beef? Why is the retail demand elasticity more elastic than the wholesale demand elasticity?

(c) Explain why the retail price did not also fall by 40 cents. (Hint: Is the processing and supermarket technology a constant return to scale technology?)

(a) Domestic wholesale consumption went up by 400%.

$$\varepsilon_w = \frac{400}{\frac{20-60}{60} * 100} = -6$$

(b) Domestic retail consumption went up by 400%

$$\varepsilon_r = \frac{400}{\frac{80-100}{100} * 100} = -20$$

(c) It is easier for consumers to substitute in consumption beef for other foods such as chicken, fish, etc. However it is harder for processors to substitute producing beef with producing chicken or fish.

(d) The numbers of cattle processor plants and storage facilities for processed beef in supermarkets are fixed in the short run. So we run up a relatively inelastic supply curve for beef if all of a sudden we want to process and sell much more beef in Canada.

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(a) What is the marginal revenue product of a courier? (3)

(b) What is the marginal cost of a courier? (2)

(c) How many couriers should she hire? (3)

(c) What is her total cost for delivering q packages? (2)

(a)

$$MRP = p * MP = 1 * \frac{50}{\sqrt{n}}$$

(b)

$$10$$

(c)

$$MRP = 10$$

$$\frac{50}{\sqrt{n^*}} = 10$$

$$n^* = 25$$

(c)

$$q = 100\sqrt{n}$$

$$n = \frac{q^2}{100}$$

$$c(q) = \frac{q^2}{100} * 10$$