

Economics 200Y: 3rd Mid Term

Name: _____

Student number: _____

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

Useful facts:

(i) Let a market demand curve be $P = a - bQ$ where P is the price charged and Q is the quantity demanded. Then revenue, $R(Q) = PQ = aQ - bQ^2$ and marginal revenue from this market demand curve is $MR(Q) = a - 2bQ$.

(ii) A firm that whose total cost of producing Q units is aQ^b , has a marginal cost curve of $MC(Q) = aQ^{b-1}$.

1. Indigo sells book X in stores and also on the internet. The demand for book X in stores is $P_s = 100 - Q_s$. The firm can also sell book X on the internet at the competitive price of P_i per book.

(a) Indigo has 100 units of output to sell. The firm chooses to sell 40 units in stores and 60 units on the internet. What is P_i ? (5)

(b) If Indigo can perfectly price discriminate in stores, how many units will it sell in stores? (5)

(a) The marginal cost of selling in stores is P_i . Marginal revenue of store sale is $100 - 2Q_s$. At 40 units, MR is $100 - 80 = 20$. Equating MR=MC implies $P_i = 20$.

(b) With perfect price discrimination, monopolist sells the last copy in store at 20. Using the store demand curve, $20 = 100 - Q_s \Rightarrow Q_s = 80$.

2. (a) Lobsters in the Atlantic provinces are harvested twice a year, in spring and in December. Harvested lobsters are kept in large pounds in the sea and in tanks on land so that live lobsters can potentially be sold around the year. Draw a figure which shows how the price and quantity of Atlantic lobsters sold in Ontario will vary over the calendar year (January to December). Explain your figure. (5)

(b) Paintings are durable goods. If John sells Q_1 paintings in the first year, he will get $P_1 = 100 - Q_1$ per painting. In the second year, if he sells Q_2 paintings, he will get $P_2 = 100 - Q_2$ per painting. Let the annual interest rate that John faces be 10%. John has 50 paintings and he wants to maximize his present value of profits from selling the paintings. Should he sell all his paintings? How many should he sell in the first year and how many should he sell in the second year? (5)

(a) After harvest, the producer have to pay for the storage and interest cost of the lobsters until it is sold. So the price of lobster is lowest and consumption highest during the harvest months. The price rises by storage and interest cost until the next harvest. As the price rises, the consumption of lobsters fall. The price of lobster may become too high and consumers will not consume lobster from that point on until the next harvest. With the next harvest, the cycle starts again.

(b) MR in year 1 is $100 - 2Q_1$. MR in year 2 discounted is $(100 - 2Q_2)/(1.1)$. If John does not sell all his paintings, then MC of a painting is zero. In this case, equating MR=MC gives $100 - 2Q_1^* = 0 \Rightarrow Q_1^* = 50$. $(100 - 2Q_2^*)/1.1 = 0 \Rightarrow Q_2^* = 50$. But this total exceeds John's 50 paintings. So John will sell all his paintings. In this case, he wants to equate MR from the first period with discounted MR from the second.

$$100 - 2Q_1^{**} = \frac{100 - 2(50 - Q_1^{**})}{1.1}$$

$$Q_1^{**} = \frac{110}{4.2}$$

3. The market demand for electricity is $P = 10 - Q$ where P is the market price and Q is the total amount sold in the market. Firm X is a monopolist, whose total cost of producing Q units of electricity is $2Q$.

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

(b) The government decides to regulate the monopolist and wants to set the price such that the monopolist makes zero profit (rate of return regulation). But because of the zero profit regulation, the regulated monopolist no longer has the incentive to minimize cost. So its total cost of producing Q units of electricity rises to $3Q$. What is the regulated price which gives the monopolist zero profit? (3)

(c) Will the government maximize consumer surplus by regulating or not regulating the monopolist? (4)

(a) MR is $10 - 2Q$. MC is 2. Equating MR=MC gives $Q_m = 4$. $P_m = 6$.

(b) Average cost is 3. Zero profit means price equals average cost. $P_r = 3$.

(c) Regulation gives a price of 3 which is lower than the monopoly price of 6. So consumer surplus under regulation is higher even though the monopolist is not minimizing cost.

4. There are equal numbers of two types of consumers in the economy, Marys and Jills. Each Mary has an endowment of 10 oranges and no apple. Mary's utility function is:

$$U(o, a) = o + 2a$$

where o is the number of oranges consumed and a is the number of apples consumed. Mary's marginal utility of oranges is one and her marginal utility of apples is two.

Each Jill has an endowment of no orange and 10 apples. Jill's utility function is:

$$V(o, a) = oa \tag{1}$$

Jill's marginal utility of oranges is a and her marginal utility of apples is o .

Let apples be the numeraire good. Let the price of oranges be p apples per orange.

(a) Let the price of oranges be p . Assume that Mary and Jill sell all their endowments to the market. How much income, in terms of apples, does Jill have? How much income, in terms of apples, does Mary have? (4)

(b) Let the price of oranges be p . How many apples and oranges will Jill and Mary each eat? (3)

(c) If Mary and Jill act competitively, what will p be? (3)

(a) Jill's income is 10. Mary income is $10p$.

(b) If $p > \frac{1}{2}$, Mary will consume all apples. If $p < \frac{1}{2}$, she will consume all oranges. If $p = \frac{1}{2}$, she is indifferent between combinations of apples and oranges which satisfy her budget constraint.

Jill will satisfy

$$\frac{a_j}{p} = o_j$$

$$a_j = p o_j$$

Satisfying her budget constraint:

$$1 * p o_j + p * o_j = 10$$

$$o_j = \frac{5}{p}$$

$$a_j = 5$$

(c) Since Jill wants to consume 5 apples, Mary has to consume 5 apples for the market to clear. And $p = \frac{1}{2}$ is the only price at which Mary is willing to consume 5 apples. So $p = \frac{1}{2}$ is the competitive price.

5. Jack is the only car dealer in a small town. He knows everyone in the town and he charges different customers different prices for the same car. Some upset customers want the mayor to stop Jack from engaging in price discrimination. Write a memo to the mayor as to whether she should ask Jack to stop his price discrimination. Include a discussion of (a) the elasticities of demand for cars by rich and poor citizens, (b) the welfare effects on rich, poor citizens and Jack. (content: 5 points, grammar: 5 points).

Because Jack knows everyone, Jack may be acting as a perfectly price discriminating monopolist. At a given price, rich customers are willing to buy more cars and have a lower elasticity of demand than poor customers. So Jack will charge rich customers a high price and poor customers a lower price. However he cannot give too large of a discount to his poorest customers in case they decide to resell their cars to richer consumers.

The other possibility is that Jack is price discriminating but does not maximize profits. Instead, he allows each consumer to get some consumer surplus. So rich customers will pay more than the poor customers but everyone gets some consumer surplus. In this case, if Jack is not allowed to price discriminate, the poor customers may not be able to afford to buy any car and will therefore suffer a welfare loss. The rich customers may be better off because he can no longer price discriminate. Thus the welfare effect on consumers by banning price discrimination depends on whether Jack is acting as a perfectly discriminating monopolist or whether he is sharing some of his profits with his consumers. We cannot assume that Jack is acting as a perfectly price discriminating monopolist because he lives in the small town and is likely to take the welfare of some of the consumers into consideration. Jack will be worse off if he cannot price discriminate because he chose to price discriminate.