Worked Solutions 5

Lectures 9 and 10.

Question	Lecture
1.	L9
2.	L9
3.	L9
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6.	L9
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10.	L9
11.	L9
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Unit 5 solutions

Exercise 1

There may be practical difficulties in checking the extent to which products are substitutes for one another. Consider the following questions.

1. Is email a substitute for 'snail mail' delivered by the postal service?

2. Are telecommunications a substitute for travel?

3. Are electronic documents a substitute for paper documents?

Answers

1. The demand for conventional mail services has risen strongly in recent years for various reasons. One reason is that technologies such as email may generate conventional mail rather than substitute for it. Email enables people to maintain a broader range of contacts, and sometimes these contacts will require an exchange of documents. Therefore, email can create a demand for physical message exchanges.

2. This is similar to 1. In some developing country cities it has been claimed in the past that improved telephone communications can reduce traffic congestion. But this seems to be exceptional. Having cheaper contacts with people by phone encourages more contacts and may encourage the need for visits. Telecommunications may thus boost the overall need for travel even though it can, in some situations such as teleconferencing, act as a substitute.

3. The paperless office was a widely-claimed virtue of improved communications technologies, though again the demand for paper products has risen in a stable way over recent years. The availability of individual access to compiling and printing documents may boost the demand for paper overall, even though certain information can be transmitted and archived electronically.

Exercise 2

The other computer operating environment that is similar is the one provided with Apple computers, the MacOS. But it is not possible to use the MacOS system on an IBM machine. What does this say about the degree of competition between these two operating systems?

Answer

Competition for the operating systems is derived from competition for the hardware. The alternative advantages of each OS will be reflected in user willingness to pay for the respective bundled hardware plus software.

Exercise 3

Suppose the revenues and costs of a monopoly seller of calculators is as follows:

Table 5.2 *Determining marginal revenue and marginal cost*

# of calculators	Total revenue	Marginal revenue	Total cost	Marginal cost
0	0		0	
1	90	90	11	11
2	175		23	
3	255		39	
4	320		59	
5	375		84	
6	420		115	
7	455		150	
8	480		200	
9	495		255	
10	500		315	
11	495		380	
12	470		450	

Fill in the remainder of the column labelled Marginal revenue.

Note: You will find that the marginal revenue is not constant. It declines as the number of units sold increases.

Now fill in the column labelled Marginal cost.

Using marginal reasoning (choosing output to equate MR and MC), indicate the profit-maximising output level in Table 5.2 with an asterisk. Check your answer by calculating total profit by subtracting total cost from total revenue.

What price should this firm charge? To answer this we need to uncover the firm's demand curve. Remembering that total revenue equals price times quantity, what price will the firm charge for its product?

Answer

# of calculators	Total revenue	Marginal revenue	Total cost	Marginal cost
0	0		0	
1	90	90	11	11
2	175	85	23	12
3	255	80	39	16
4	320	65	59	20
5	375	55	84	25
6	420	45	115	31
7 (*)	455	35	150	35
8	480	25	200	50
9	495	15	255	55
10	500	5	315	60
11	495	–5	380	65
12	470	–25	450	70

Marginal cost equals marginal revenue at seven units of output. Total profit then is revenue – costs = \$455 – \$150 = \$305, which is a maximum.

Price for this output is total revenue/output = \$455/7 = \$65.

Exercise 4

The demand curve for a monopolist is p=100–5y, where p is price and y is output. Suppose this monopolist had constant costs of producing equal to \$10 per unit. How much should the monopolist produce to maximise profit and what single price should be charged? What is the maximised value of the monopolist's profits?

Answers

Marginal revenue here is MR = 100 – 10y (double the slope!), which must be equated to marginal cost MC = 10 to maximise profits. Hence, 100 – 10y = 10 so y = 9. Therefore, price set will be p=100 – (5 × 9) = \$55. The monopolist's profit is equal to revenue less costs = (\$55 × 9) – (\$10 × 9) = \$405

Exercise 5

Taxes of various types have been proposed to transfer some of the profits a monopolist earns into the state's coffers. Suppose using these taxes the state provides public goods that in part compensate consumers for the costs they experience due to monopoly. Tax policies will worsen these costs if they raise prices further and restrict output, more. If, however, taxes do not affect prices and output, then they will at least not increase these social costs; in this latter case the taxes are said to be **neutral**.

Consider profit taxes (a tax of a fixed share of gross profits); lump-sum taxes (a tax of a fixed amount paid regardless of what a monopolist produces); quantity taxes (taxes per unit of output produced); and value (or *ad valorem*) taxes that are levied on revenues.

1. Which of these taxes are neutral?

2. How do non-neutral taxes impact on a monopoly's pricing and output?

3. Could there be a rationale for governments subsidising monopolies?

Answers

1. Profit taxes and lump-sum taxes are neutral. To see this, suppose a tax t is set on profits. The net profits $\prod = (1 - t)(R - C)$. These are maximised when R – C is maximised, when MR = MC. But this is the condition for profit maximisation without taxes. Hence, profit taxes do not affect output or pricing. Lump-sum taxes are neutral because, by definition, they have no effect on a firm's marginal revenues or marginal costs. They must be paid regardless of how much is produced.

   Quantity and value taxes are non-neutral because they affect marginal revenue: they shift it to the left.

2. The non-neutral taxes, by shifting MR to the left, will reduce a monopolist's desired output and raise the price charged.

3. This has been advocated. A subsidy will shift MR to the right, increasing output and reducing price. It will hardly be popular policy since it increases the profits of a firm earning above average profits but it does reduce deadweight losses.

Exercise 6

TGB has its domestic market protected by law from import competition and demand for its product is given by $p_d = 120 - y_d/10$, where p_d is domestic price and y_d is domestic output. In the more competitive international market, TGB can sell (by exporting) whatever it wants in quantity y_e at price $p_e = 80$.

TGB's marginal cost is $MC = 50 + (y_d + y_e)/10$. How much should TGB produce for each market to maximise profit and what price should it set in each market?

Answer

The firm should set MR in each market equal to MC.

In the domestic market $MR = 120 - y_d/5 = 50 + (y_d + y_e)/10$.

In the international market $MR = 80 = 50 + (y_d + y_e)/10$ so, $y_d + y_e = 300$.

Hence, in the domestic market $120 - y_d/5 = 80$ or $y_d = 200$ so, $p_d = 120 - 200/10 = \$100$.

Hence, the firm should produce 300 units of output, of which 200 should be sold domestically at price $100 and 100 units should be sold internationally at price $80.

Exercise 7

For a time Ford Australia produced a sports car in Australia (the 'Capri') which it sold in the Australian market and also exported to the US. The Capri sold for a higher price in Australia than it did in the US. Why might this be so?

Answer

It might be because the demand for sports cars in the US is more elastic than in Australia because of the range of available products.

Exercise 8

Sometimes a firm charges an entry fee for a facility but then gives away some free units. Why?

Answer

Some people might have relatively low willingness to pay for the offerings inside the facility. Offering some free units inside the facility might induce some of these people to pay the entrance fee.

Exercise 9

A local chamber orchestra, *Aimez-Vous Baroque*, is performing five concerts per season, all Bach. Gina is a Baroque music maniac and intends to attend as many concerts as possible. Her willingness to pay for the five concerts is as follows: $60 for the first concert, $55 for the second, $50 for the third, $45 for the fourth and $40 for the fifth concert. This willingness is known to the orchestra. The orchestra reckons that the cost of each concert per attendee is constant at $40. Let's assume the are no fixed costs.

a. If *Aimez-Vous Baroque* has to sell tickets to Gina at the same price for all five concerts, what is the profit-maximising price? How many tickets are sold, and what are the profits? (The orchestra will choose the price where marginal revenue is equal to marginal cost.)

b. If *Aimez-Vous Baroque* can exercise perfect price discrimination, what would be the prices for the five concerts? What are the profits then?

c. Suppose *Aimez-Vous Baroque* can sell tickets in the following way. Gina has to pay a fixed amount F for her subscription. In return she gets occasional promotional service from *Aimez-Vous Baroque*, which is costless to the orchestra. To attend each concert, she has to pay additional price P. What would the profit-maximising combination of F and P be?

Answer

a. We could set the quantity of concerts for Gina at a level when Marginal Revenue = Marginal Cost.

Consider the following table:

Price ($)	Quantity	Total Revenue	Marginal Revenue	Marginal Cost	AVB Profit	Gina's CS
60	1	60	60	40	20	0
55	2	110	50	40	30	5
50	3	150	40	40	30	15
45	4	180	30	40	20	30
40	5	200	20	40	0	50

AVB profit is maximised at $30 when P= $55 or $50 per concert and Q= 2 or 3 concerts, respectively. Gina's CSurplus is $5 or $15, respectively. (Note that total social surplus = AVB profit + Gina's CS is maximised at $50 when P= $45 or$40, and Q= 4 or 5, respectively; i.e. when P= MC= $40.)

b.   Perfect price discrimination means that AVB captures all of Gina's surplus. So AVB would charge $60, $55,$50,$45, and $40 for the first, second, third, fourth, and fifth concert, respectively. (Although at P= $40, with MC= $40, AVB is indifferent between selling 4 or 5 tickets, since its profit is zero for the fifth.)

c.   This is a question about a two-part tariff. From the table above, if F= $30 and P= $45, AVB's profit will be $50, and Gina's zero. Or AVB could set P= $40, AND F= $50; the two surpluses are unchanged, although Gina now goes to 5 concerts, not 4.

Exercise 10

Suppose a fitness centre has the following schedule of fees and charges.

Table 5.4 *Gym membership fees*

Usage	Fee	Pricing scheme
Casual visit	$10 per visit	
Special visitor	$25 monthly fee $5 per visit	
Off-peak membership (8am –12 week days)	$400 annual fee Each visit free	
Fanatic membership	$800 annual fee Each visit free	

In the space provided in Table 5.4, write down the type of pricing scheme being used. Below, write what the manager of the fitness centre assumes about each type of customer and their price elasticity of demand.

Answers

The second scheme represents a two-part tariff: the customer is required to pay a joining fee and then pay a small fee for each visit. The third and fourth schemes are based on giving the customer a quantity discount (the more they use the facilities, the greater the discount per visit). It is up to the customer to determine what level of discount she/he receives. Of course, these schemes are also sold to people who start the year out with great intentions, but either lack the staying power or find other commitments too pressing. Then, it is the firm that gets the benefit of charging the consumer for services they never claim.

Consumers who are willing to pay for these expensive memberships may have low elasticity of demand, similar to our flying executives. They want the convenience of being able to attend any time they like, as often as they like, and they are willing to pay for it. The consumer who pays $10 a visit may be paying more for the single visit, but they are getting exactly what they paid for; they will not be out of pocket if aspirations for fitness desert them.

Exercise 11

Suppose a firm, Xerxes Ltd, cannot price discriminate across customers, but does have the option to bundle the two goods it sells. Suppose the two products it sells (Xerxes Word Processor and Xerxes Spreadsheet) are purchased by two types of customer (each comprising 50 per cent of the market) whose willingness to pay for the products is as follows:

Table 5.5 *Willingness to pay*

	Xerxes Wordprocessor	Xerxes Spreadsheet
Customer Type 1	$150	$100
Customer Type 2	$100	$150

Ignoring costs (which are negligible) how much more profit will Xerxes earn by bundling the two products together and selling them jointly at $250 for the bundle ('suite') rather than selling each item at $100 or selling each item at $150?

How does this level of profitability compare with the profits achievable assuming that perfect price discrimination is feasible?

Answers

With a price of $100, each item will be sold to both, so profits per pair of customers would be $400. With a price of $150 per item, only one item will be sold per customer, yielding profits per pair of customers equal to $300. The bundled objects will be sold at $250 per bundle, yielding profits per pair of customers equal to $500. Because of the symmetry of the problem, this is the same profit yielded by perfect price discrimination.

Exercise 12

What are the factors that determine the extent of excess capacity in a firm in a monopolistically competitive market structure?

Answer

The long-run equilibrium of a firm under monopolistic competition can be graphed as follows:
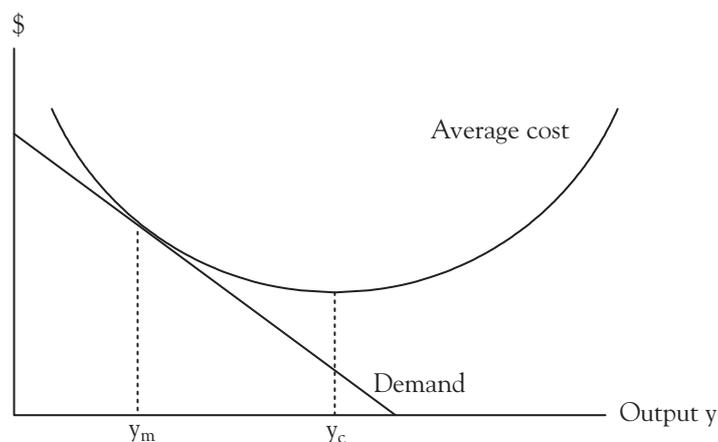
The long-run equilibrium involves a tangency between the demand curve and the average cost curve, where price equals average cost, so no profits are earned and output y_m is produced. The excess capacity is the difference between the competitive output, which minimises average cost y_c, and the monopolistically competitive output y_m, which is the distance $y_c - y_m$.

The greater the degree of price inelastic demand, the steeper the demand curve, and so the greater the distance $y_c - y_m$. Therefore, the greater the firm's short-run monopoly power, the greater the excess capacity.

The greater the degree of economies of scale, the greater the distance.