SOLUTIONS TO TEXT PROBLEMS:

Quick Quizzes

1. A market might have a monopoly because: (1) a key resource is owned by a single firm; (2) the government gives a single firm the exclusive right to produce some good; and (3) the costs of production make a single producer more efficient than a large number of producers.

   Examples of monopolies include: (1) the water producer in a small town, which owns a key resource, the one well in town; (2) pharmaceutical companies who are given a patent on a new drug by the government; and (3) a bridge, which is a natural monopoly because (if the bridge is uncongested) having just one bridge is efficient. Many other examples are possible.

2. A monopolist chooses the amount of output to produce by finding the quantity at which marginal revenue equals marginal cost. It finds the price to charge by finding the point on the demand curve at that quantity.

3. A monopolist produces a quantity of output that's less than the quantity of output that maximizes total surplus because it produces the quantity at which marginal cost equals marginal revenue rather than the quantity at which marginal cost equals price.

4. Policymakers can respond to the inefficiencies caused by monopolies in one of four ways: (1) by trying to make monopolized industries more competitive; (2) by regulating the behavior of the monopolies; (3) by turning some private monopolies into public enterprises; and (4) by doing nothing at all. Antitrust laws prohibit mergers of large companies and prevent them from coordinating their activities in ways that make markets less competitive, but such laws may keep companies from merging to gain from synergies. Some monopolies, especially natural monopolies, are regulated by the government, but it is hard to keep a monopoly in business, achieve marginal-cost pricing, and give the monopolist incentive to reduce costs. Private monopolies can be taken over by the government, but the companies are not likely to be well run. Sometimes doing nothing at all may seem to be the best solution, but there are clearly deadweight losses from monopoly that society will have to bear.

5. Examples of price discrimination include: (1) movie tickets, for which children and senior citizens get lower prices; (2) airline prices, which are different for business and leisure travelers; (3) discount coupons, which lead to different prices for people who value their time in different ways; (4) financial aid, which offers college tuition at lower prices to poor students and higher prices to wealthy students; and (5) quantity discounts, which offer lower prices for higher quantities, capturing more of a buyer's willingness to pay. Many other examples are possible.

   Perfect price discrimination reduces consumer surplus, increases producer surplus by the same amount, and has no effect on total surplus, compared to a competitive market. Compared to a monopoly that charges a single price, perfect price discrimination reduces consumer surplus, increases producer surplus, and increases total surplus, since there is no deadweight loss.

Questions for Review

1. An example of a government-created monopoly comes from the existence of patent and copyright laws. Both allow firms or individuals to be monopolies for extended periods of time—20 years for patents, forever for copyrights. But this monopoly power is good, because without

it, no one would write a book (because anyone could print copies of it, so the author would get no income) and no firm would invest in research and development to invent new products or drugs (since any other company could produce or sell them, and the firm would get no profit from its investment).

2. An industry is a natural monopoly when a single firm can supply a good or service to an entire market at a smaller cost than could two or more firms. As a market grows it may evolve from a natural monopoly to a competitive market.

3. A monopolist's marginal revenue is less than the price of its product because: (1) its demand curve is the market demand curve, so (2) to increase the amount sold, the monopolist must lower the price of its good for every unit it sells. (3) This cut in prices reduces revenue on the units it was already selling.

   A monopolist's marginal revenue can be negative because to get purchasers to buy an additional unit of the good, the firm must reduce its price on *all* units of the good. The fact that it sells a greater quantity increases revenue, but the decline in price decreases revenue. The overall effect depends on the elasticity of the demand curve. If the demand curve is inelastic, marginal revenue will be negative.

4. Figure 1 shows the demand, marginal-revenue, and marginal-cost curves for a monopolist. The intersection of the marginal-revenue and marginal-cost curves determines the profit-maximizing level of output, Q_m. The demand curve then shows the profit-maximizing price, P_m.

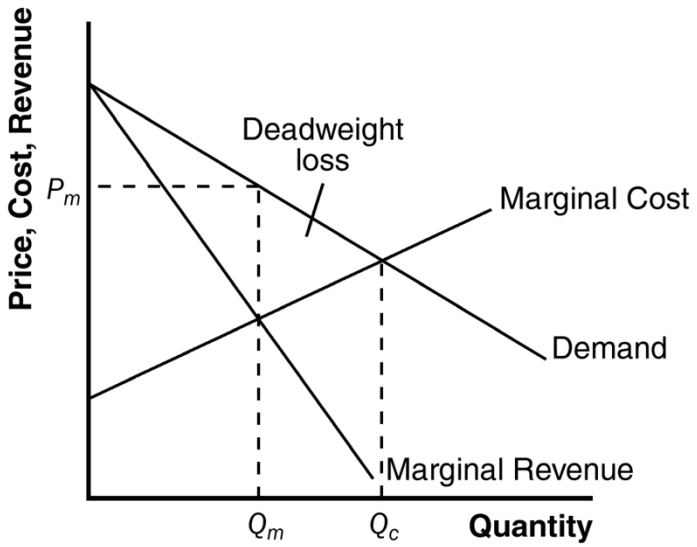

Figure 1

5. The level of output that maximizes total surplus in Figure 1 is where the demand curve intersects the marginal-cost curve, Q_c. The deadweight loss from monopoly is the triangular area between Q_c and Q_m that is above the marginal-cost curve and below the demand curve. It represents deadweight loss, since society loses total surplus because of monopoly, equal to the value of the good (measured by the height of the demand curve) less the cost of production (given by the height of the marginal-cost curve), for the quantities between Q_m and Q_c.

6. The government has the power to regulate mergers between firms because of antitrust laws.

Firms might want to merge to increase operating efficiency and reduce costs, something that is good for society, or to gain monopoly power, which is bad for society.

7. When regulators tell a natural monopoly that it must set price equal to marginal cost, two problems arise. The first is that, because a natural monopoly has a constant marginal cost that is less than average cost, setting price equal to marginal cost means that the price is less than average cost, so the firm will lose money. The firm would then exit the industry unless the government subsidized it. However, getting revenue for such a subsidy would cause the government to raise other taxes, increasing the deadweight loss. The second problem of using costs to set price is that it gives the monopoly no incentive to reduce costs.

8. One example of price discrimination is in publishing books. Publishers charge a much higher price for hardback books than for paperback books—far higher than the difference in production costs. Publishers do this because die-hard fans will pay more for a hardback book when the book is first released. Those who don't value the book as highly will wait for the paperback version to come out. The publisher makes greater profit this way than if it charged just one price.

   A second example is the pricing of movie tickets. Theaters give discounts to children and senior citizens because they have a lower willingness to pay for a ticket. Charging different prices helps the theater increase its profit above what it would be if it charged just one price.

Problems and Applications

1. The following table shows revenue, costs, and profits, where quantities are in thousands, and total revenue, total cost, and profit are in millions of dollars:

Price	Quantity (1,000s)	Total Revenue	Marginal Revenue	Total Cost	Profit
$ 100	0	$ 0	----	$ 2	$ -2
90	100	9	$ 9	3	6
80	200	16	7	4	12
70	300	21	5	5	16
60	400	24	3	6	18
50	500	25	1	7	18
40	600	24	-1	8	16
30	700	21	-3	9	12
20	800	16	-5	10	6
10	900	9	-7	11	-2
0	1,000	0	-9	12	-12

   a. A profit-maximizing publisher would choose a quantity of 400,000 at a price of $60 or a quantity of 500,000 at a price of $50; both combinations would lead to profits of $18 million.

   b. Marginal revenue is always less than price. Price falls when quantity rises because the demand curve slopes downward, but marginal revenue falls even more than price because the firm loses revenue on all the units of the good sold when it lowers the price.

   c. Figure 2 shows the marginal-revenue, marginal-cost, and demand curves. The marginal-revenue and marginal-cost curves cross between quantities of 400,000 and 500,000. This signifies that the firm maximizes profits in that region.

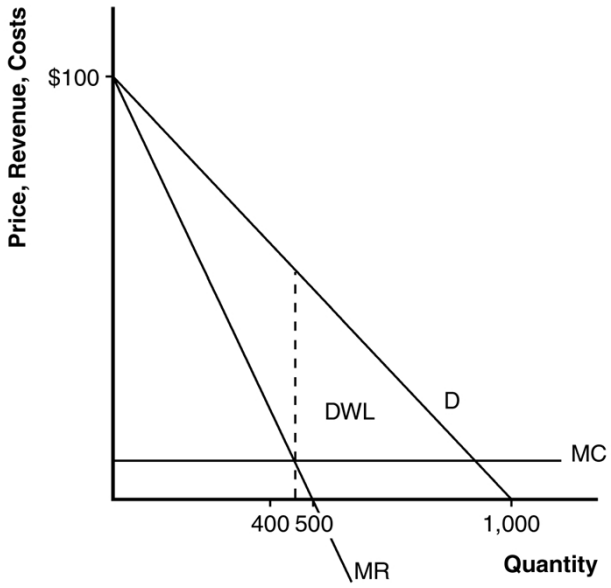

Figure 2

d. The area of deadweight loss is marked "DWL" in the figure. Deadweight loss means that the total surplus in the economy is less than it would be if the market were competitive, since the monopolist produces less than the socially efficient level of output.

e. If the author were paid $3 million instead of $2 million, the publisher wouldn't change the price, since there would be no change in marginal cost or marginal revenue. The only thing that would be affected would be the firm's profit, which would fall.

f. To maximize economic efficiency, the publisher would set the price at $10 per book, since that's the marginal cost of the book. At that price, the publisher would have negative profits equal to the amount paid to the author.

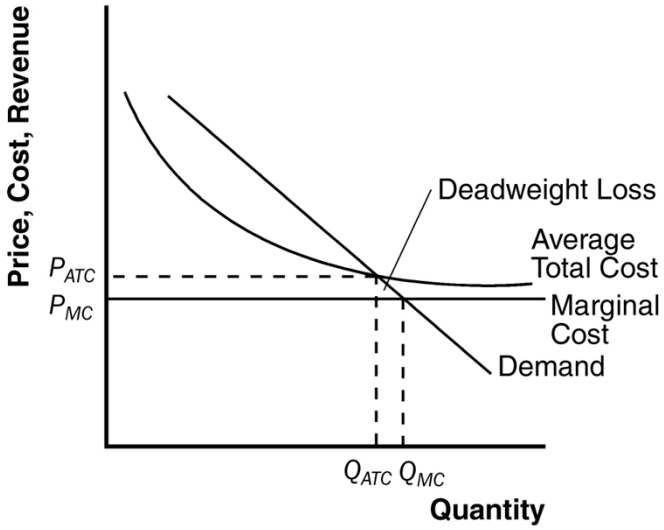

Figure 3

2. Figure 3 illustrates a natural monopolist setting price, P_{ATC}, equal to average total cost. The equilibrium quantity is Q_{ATC}. Marginal cost pricing would yield the price P_{MC} and quantity Q_{MC}. For quantities between Q_{ATC} and Q_{MC}, the benefit to consumers (measured by the demand curve) exceeds the cost of production (measured by the marginal cost curve). This means that the deadweight loss from setting price equal to average total cost is the triangular area shown in the figure.

3. Mail delivery has an always-declining average-total-cost curve, since there are large fixed costs for equipment. The marginal cost of delivering a letter is very small. However, the costs are higher in isolated rural areas than they are in densely populated urban areas, since transportation costs differ. Over time, increased automation has reduced marginal cost and increased fixed costs, so the average-total-cost curve has become steeper at small quantities and flatter at high quantities.

4. If the price of tap water rises, the demand for bottled water increases. This is shown in Figure 4 as a shift to the right in the demand curve from D_1 to D_2. The corresponding marginal-revenue curves are MR_1 and MR_2. The profit-maximizing level of output is where marginal cost equals marginal revenue. Prior to the increase in the price of tap water, the profit-maximizing level of output is Q_1; after the price increase, it rises to Q_2. The profit-maximizing price is shown on the demand curve: it is P_1 before the price of tap water rises, and it rises to P_2 after. Average cost is AC_1 before the price of tap water rises and AC_2 after. Profit increases from $(P_1 - AC_1) \times Q_1$ to $(P_2 - AC_2) \times Q_2$.

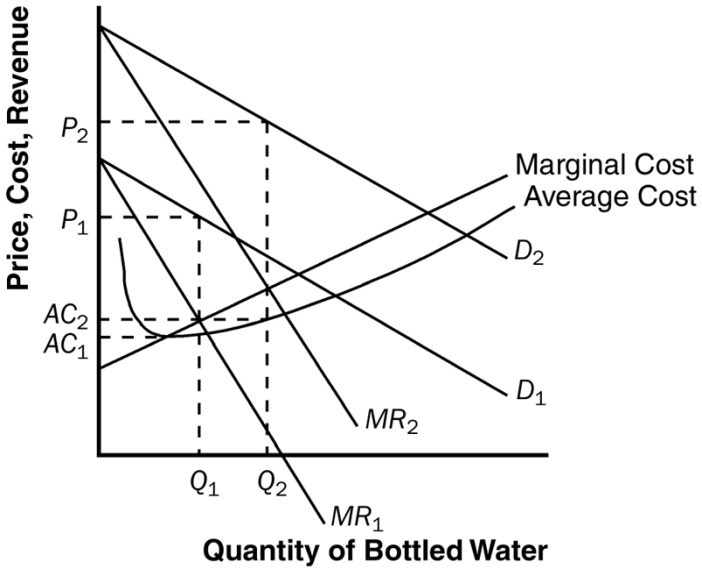

Figure 4

5. a. Figure 5 illustrates the market for groceries when there are many competing supermarkets with constant marginal cost. Output is Q_C, price is P_C, consumer surplus is area A, producer surplus is zero, and total surplus is area A.

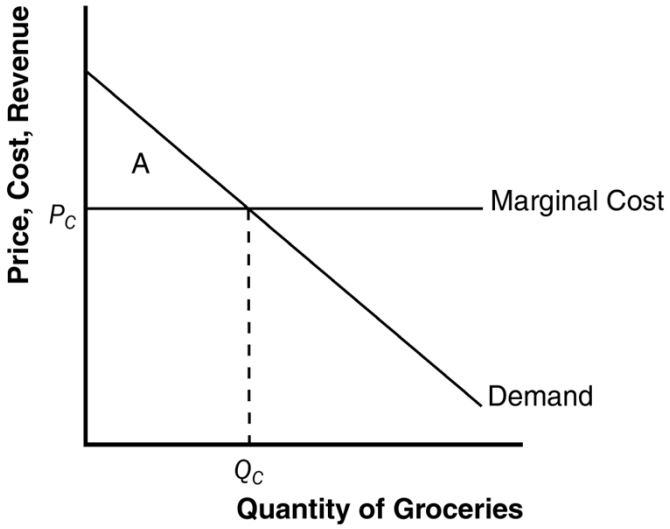

Figure 5

b. If the supermarkets merge, Figure 6 illustrates the new situation. Quantity declines from Q_C to Q_M and price rises to P_M. Area A in Figure 5 is equal to area B + C + D + E + F in Figure 6. Consumer surplus is now area B + C, producer surplus is area D + E, and total surplus is area B + C + D + E. Consumers transfer the amount of area D + E to producers and the deadweight loss is area F.

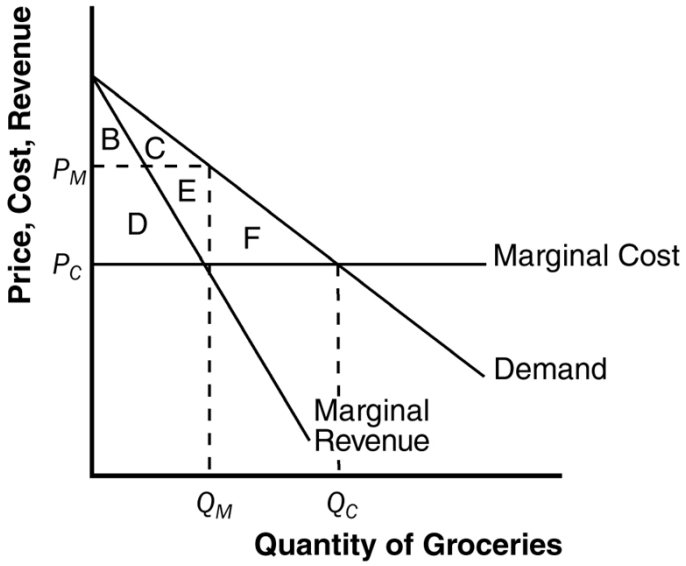

Figure 6

6. a. The following table shows total revenue and marginal revenue for each price and quantity sold:

Price	Quantity	Total Revenue	Marginal Revenue	Total Cost	Profit
24	10,000	$ 240,000	----	$ 50,000	$ 190,000
22	20,000	440,000	$ 20	100,000	340,000
20	30,000	600,000	16	150,000	450,000
18	40,000	720,000	12	200,000	520,000
16	50,000	800,000	8	250,000	550,000
14	60,000	840,000	4	300,000	540,000

b. Profits are maximized at a price of $16 and quantity of 50,000. At that point, profit is $550,000.

c. As Johnny's agent, you should recommend that he demand $550,000 from them, so he instead of the record company receives all of the profit.

7. IBM's monopoly power will be constrained to the extent that people can substitute other computers for mainframes. So the government might have looked at the demand curve facing IBM, or the divergence between IBM's price and marginal cost, to get some idea of how severe the monopoly problem was.

8. a. The table below shows total revenue and marginal revenue for the bridge. The profit-maximizing price would be where revenue is maximized, which will occur where marginal revenue equals zero, since marginal cost equals zero. This occurs at a price of $4 and quantity of 400. The efficient level of output is 800, since that's where price equals

marginal cost equals zero. The profit-maximizing quantity is lower than the efficient quantity because the firm is a monopolist.

Price	Quantity	Total Revenue	Marginal Revenue
$ 8	0	$ 0	----
7	100	700	$ 7
6	200	1,200	5
5	300	1,500	3
4	400	1,600	1
3	500	1,500	-1
2	600	1,200	-3
1	700	700	-5
0	800	0	-7

b. The company should not build the bridge because its profits are negative. The most revenue it can earn is $1,600,000 and the cost is $2,000,000, so it would lose $400,000.

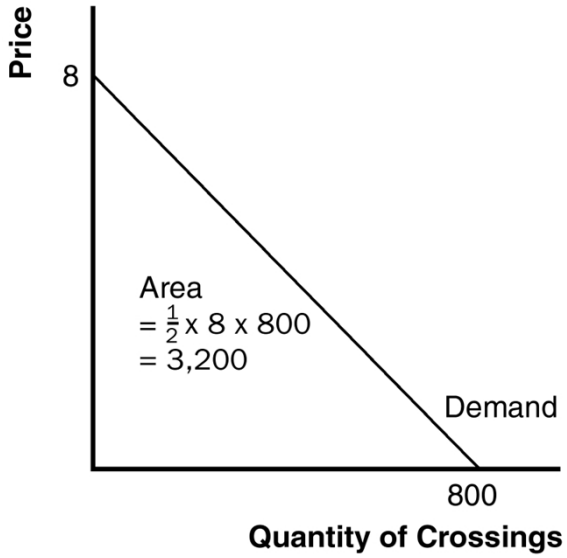

Figure 7

c. If the government were to build the bridge, it should set price equal to marginal cost to be efficient. But marginal cost is zero, so the government should not charge people to use the bridge.

d. Yes, the government should build the bridge, because it would increase society's total surplus. As shown in Figure 7, total surplus has area 1/2 x 8 x 800,000 = $3,200,000, which exceeds the cost of building the bridge.

9. a. Figure 8 illustrates the drug company's situation. They will produce quantity Q_1 at price P_1. Profits are equal to (P_1 - AC_1) x Q_1.

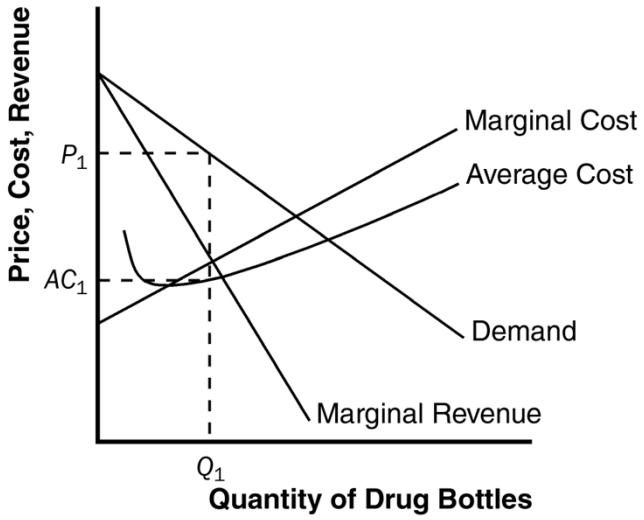

Figure 8

b. The tax on the drug increases both marginal cost and average cost by the amount of the tax. As a result, as shown in Figure 9, quantity is reduced to Q_2, price rises to P_2, and average cost plus tax rises to AC_2.

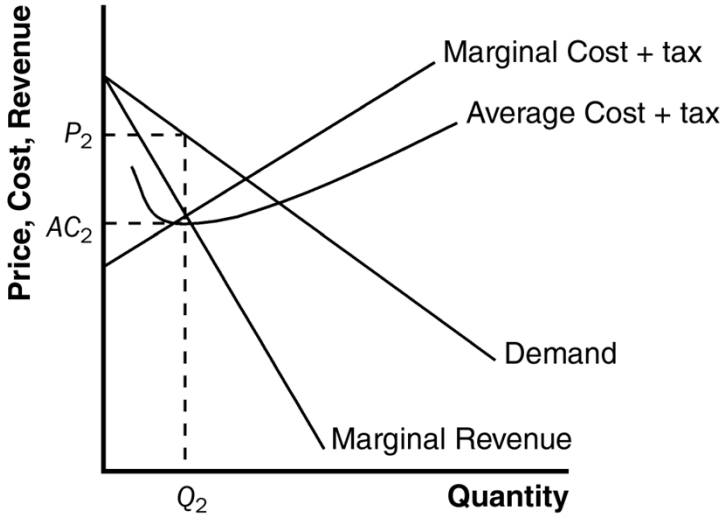

Figure 9

c. The tax definitely reduces profits. After all, the firm could have produced quantity Q_2 at price P_2 before the tax was imposed, but it chose not to because this level did not maximize profit before the tax occurred.

d. A tax of $10,000 regardless of how many bottles of the drug are produced would result in the quantity produced at Q_1 and the price at P_1 in Figure 8 because such a tax does not affect marginal cost or marginal revenue. It does, however, raise average cost; in fact, profits decline by exactly $10,000.

10. Larry wants to sell as many drinks as possible without losing money, so he wants to set quantity where price (demand) equals average cost, which occurs at quantity Q_L and price P_L in Figure 10.

Curly wants to bring in as much revenue as possible, which occurs where marginal revenue equals zero, at quantity Q_C and price P_C. Moe wants to maximize profits, which occurs where marginal cost equals marginal revenue, at quantity Q_M and price P_M.

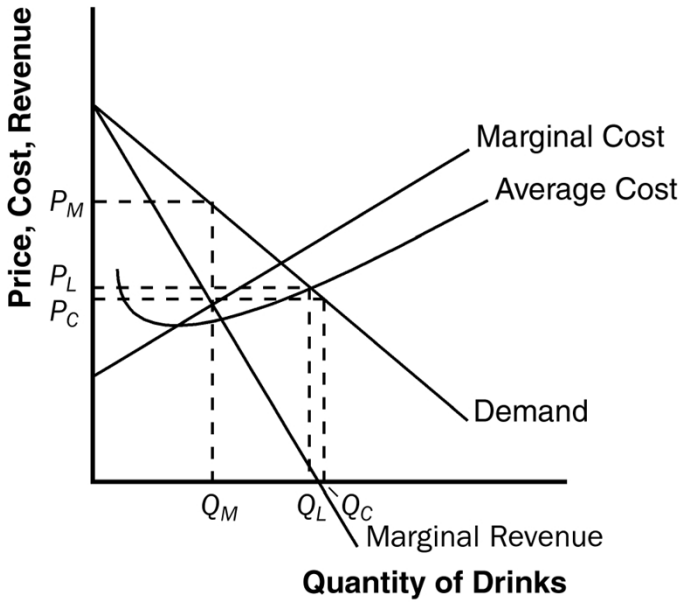

Figure 10

11. a. Long-distance phone service was originally a natural monopoly because installation of phone lines across the country meant that one firm's costs were much lower than if two or more firms did the same thing.

    b. With communications satellites, the cost is no different if one firm supplies them or if many firms do so. So the industry evolved from a natural monopoly to a competitive market.

    c. It is efficient to have competition in long-distance phone service and regulated monopolies in local phone service because local phone service remains a natural monopoly (being based on land lines) while long-distance service is a competitive market (being based on satellites).

12. a. The patent gives the company a monopoly, as shown in Figure 11. At a quantity of Q_M and price of P_M, consumer surplus is area A + B, producer surplus is area C + D, and total surplus is area A + B + C + D.

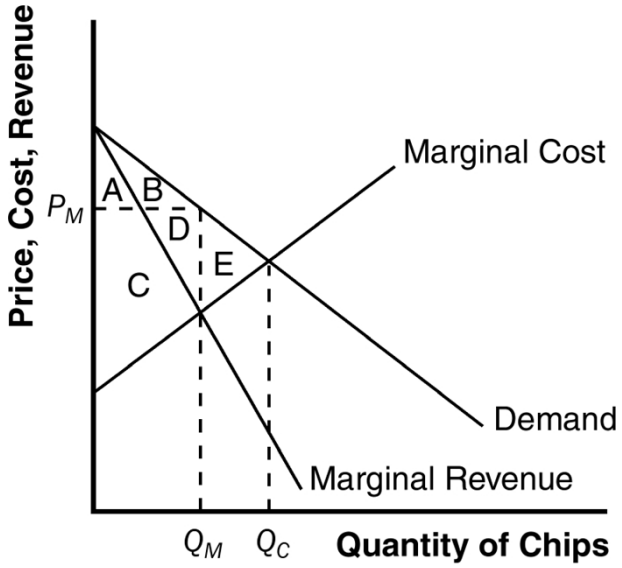

Figure 11

b. If the firm can perfectly price discriminate, it will produce quantity Q_C and extract all the consumer surplus. Consumer surplus is zero and producer surplus is A + B + C + D + E, as is total surplus. Deadweight loss is reduced from area E to zero. There is a transfer of surplus from consumers to producers of area A + B.

13. A monopolist always produces a quantity at which the demand curve is elastic. If the firm produced a quantity for which the demand curve were inelastic, then if the firm raised its price, quantity would fall by a smaller percentage than the rise in price, so revenue would increase. Since costs would decrease at a lower quantity, the firm would have higher revenue and lower costs, so profit would be higher. Thus the firm should keep raising its price until profits are maximized, which must happen on an elastic portion of the demand curve.

Another way to see this is to note that on an inelastic portion of the demand curve, marginal revenue is negative. Increasing quantity requires a greater percentage reduction in price, so revenue declines. Since a firm maximizes profit where marginal cost equals marginal revenue, and marginal cost is never negative, the profit-maximizing quantity can never occur where marginal revenue is negative, so can never be on an inelastic portion of the demand curve.

14. Though Britney Spears has a monopoly on her own singing, there are many other singers in the market. If Spears were to raise her price too much, people would substitute to other singers. So there is no need for the government to regulate the price of her concerts.

15. Because the marginal cost of the music was virtually zero, Napster enhanced economic efficiency because those individuals who valued the music more than zero but less than the selling price were able to consume it. However, in the long run, musicians and record companies would have no incentive to release new music because everyone could own a copy of it without paying for it. The courts eventually shut Napster down because they believed that this access violated copyright laws.

16. a. Figure 12 shows the cost, demand, and marginal-revenue curves for the monopolist. Without price discrimination, the monopolist would charge price P_M and produce quantity Q_M.

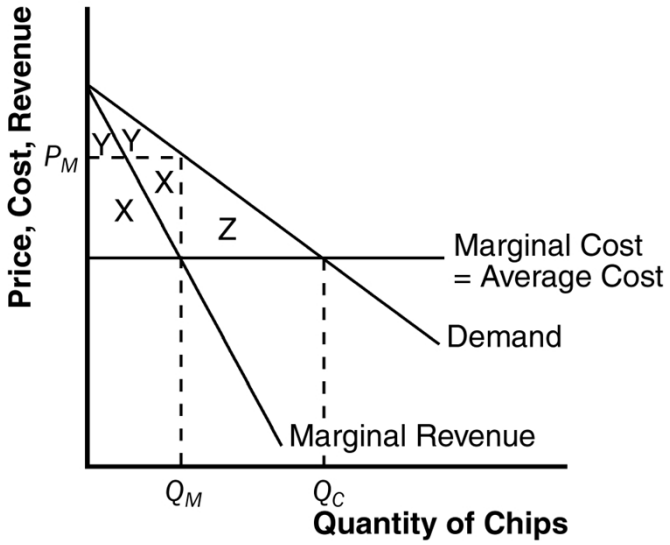

Figure 15-12

b. The monopolist's profit consists of the two areas labeled X, consumer surplus is the two areas labeled Y, and the deadweight loss is the area labeled Z.

c. If the monopolist can perfectly price discriminate, it produces quantity Q_C, and has profit equal to X + Y + Z.

d. The monopolist's profit increases from X to X + Y + Z, an increase in the amount Y + Z. The change in total surplus is area Z. The rise in monopolist's profit is greater than the change in total surplus, since monopolist's profit increases both by the amount of deadweight loss (Z) and by the transfer from consumers to the monopolist (Y).

e. A monopolist would pay the fixed cost that allows it to discriminate as long as Y + Z (the increase in profits) exceeds C (the fixed cost).

f. A benevolent social planner who cared about maximizing total surplus would want the monopolist to price discriminate only if Z (the deadweight loss from monopoly) exceeded C (the fixed cost) since total surplus rises by Z - C.

g. The monopolist has a greater incentive to price discriminate (it will do so if Y + Z > C) than the social planner would allow (she would allow it only if Z > C). Thus if Z < C but Y + Z > C, the monopolist will price discriminate even though it is not in society's best interest.