Answers to Odd-Numbered Problems

I was gratified to be able to answer promptly. I said I don't know. —Mark Twain

Chapter 2

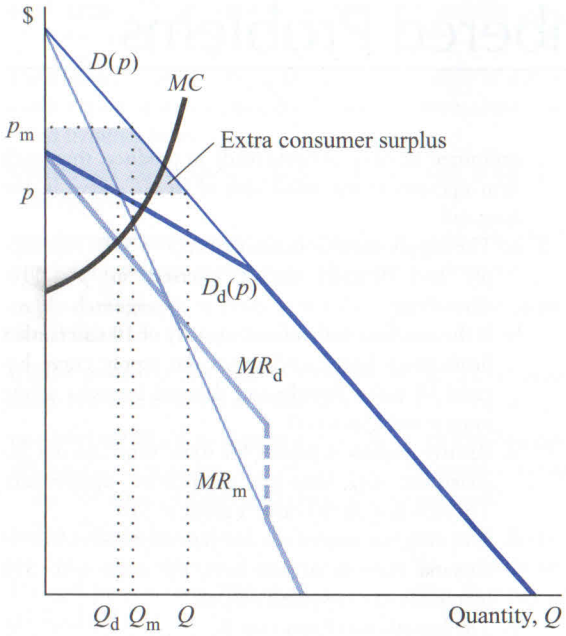
1. Although some monitoring problems increase with size, large firms exist because some benefits also increase with size, and other monitoring problems decrease as size increases. For example, the average cost of monitoring quality may fall with size if the firm can obtain reliable results by checking a small percentage of a large output.
3. Transaction costs are likely to be relatively high in (a), (b), and (c). In these three cases, there is likely to be only one firm.
5. No. Even if all costs are fixed, marginal cost need not be zero. For example, if a firm is operating at full capacity and is unable to produce more output, its marginal costs are effectively infinitely large (at no finite cost can an extra unit of output be produced).
7. The marginal cost of an extra car is 70. Producing 100 cars and 200 trucks in the same plant costs \$33,000 (10,000 + (70 × 100) + (80 × 200)). Producing them in two separate plants costs \$17,000 for cars and \$26,000 for trucks. Thus, the savings from jointly producing them is \$10,000 (the extra fixed cost). The measure of scope economies is 10,000/33,000 or about 0.3.
9. If all plants are in the same area, they face similar costs. If the industry is in equilibrium, then a wide range of plant sizes indicates that the *AC* curve has a flat section over a wide range of output. If plants are located in different countries, they are likely to face different costs, so that all one can conclude is that the efficient-scale plant may vary considerably depending on cost conditions.

Chapter 3

1. No, a tax of \$1 per unit of output raises the *AC* and *MC* curves of the firm by \$1. As a result, the output at which the *AC* curve reaches its minimum is unchanged by the tax. If all competitive firms are identical and there are an unlimited number of firms ready to produce, then each firm operates at the minimum of its *AC* curve in the long run.
3. a. The supply curve is horizontal at $p = \$10$. The supply and demand curves intersect at $p = \$10$, $Q = 990$.
   b. If the one firm with a fixed capacity of 10 enters, that firm's entry leaves unchanged the supply curve beyond 10 units. Supply and demand intersect at the same p and Q as in (a).
   c. Positive economic profits for some firms are not inconsistent with long-run competitive equilibrium. The new firm in (b) earns a profit of \$10.
   d. The marginal cost of the last unit supplied is \$10. If demand expands or contracts, the firms with \$10 marginal costs vary their output.
   e. The less efficient firms earn 0.
   f. Yes. Otherwise additional entry or exit would occur.
5. When there are no shutdown costs, the *AC* curve coincides with the *AVC* curve, and the shutdown point becomes the minimum point of the *AC* curve.

Chapter 4

1. The monopoly's profit is $(p - 4)(10 - p)$. A p of \$7 maximizes its profit. If $p = \$7$, $Q = 3$. Because $dQ/dp = -1$, the elasticity, $(dQ/dp)(p/Q)$, is $-7/3$.
3. Because $Q = 5/p$, $dQ/dp = -5/p^2$, and the elasticity, $(dQ/dp)(p/Q)$, is $(-5/p^2)[p/(5/p)] = -1$. Total revenue equals pQ, which always equals 5. Because revenue always equals \$5, the monopoly maximizes its profit where its total costs are as low as possible. That is, the monopoly should produce as little as possible, one unit, to maximize its profit at \$4.
5. Under competition, all 5 units are always sold, so that the supply curve is vertical at $Q = 5$. Supply equals demand at $Q = 5$, $p = 5$. The monopoly maximizes its profit. If it sells fewer than 5 units, its profit falls because its marginal revenue is positive if output is less than 5 (and hence above its marginal cost). If the monopoly sells 5 units, price equals 5. Hence, monopoly and competition produce identical results.



7. In the figure, the dominant firm sells Q_d, whereas the monopoly sells Q_m. Because the monopoly could have sold Q_d and chose not to, it must make higher profits at Q_m. The monopoly's costs to produce the extra output are the area under the MC curve between Q_d and Q_m. Its extra revenues are the area under the marginal revenue curve, MR_m, between Q_d and Q_m. Thus, by producing Q_m instead of Q_d, its profit increases by the area between the MR_m and the MC curve between Q_d and Q_m. On the first Q_d units, the monopoly's costs are the same as the dominant firm's (by assumption), and it receives a higher price, p_m instead of p. Thus, the monopoly makes more on the first Q_d units as well, and hence must make higher profits overall. The figure shows the consumers' gain.
9. In the figure in the answer to Problem 4.7 above, if the MC curve crosses the MR_d and the MR_m curves below the point where the marginal revenue curves cross, a dominant firm produces more than does a monopoly.

Chapter 5

1. Your drawing should look like Figure 4.6b if you assume no entry, where the cartel acts as though it is a dominant firm. If you assume free entry, your drawing should look like Figure 4.7b. If the cartel's marginal costs are low enough so that it maximizes its profits at a price below the noncartel member's shut-down price, the cartel drives the fringe out of business.
3. Your graph should show that as the demand curve becomes flatter at a given point (that is, its elasticity increases), the cartel's residual demand curve also becomes flatter. As a result, the intersection of MC and residual MR occurs at a lower quantity and a lower price.
5. Because noncartel members produce more than cartel members, shifting one of the n firms from the cartel to the noncartel group increases output, all else the same. Increasing the number of noncartel firms, j, causes the cartel's quantity to fall, as we show by differentiating Equation 5A.11:

$$\frac{dQ_m}{dj} = -\frac{(a - bd)(be + n)}{(be + 2n - j)^2} < 0.$$

This derivative is negative because $(a - bd)$ is positive (were it not, Q_m would be negative). Total output, Q, is the sum of the fringe supply, $j(p - d)/e$, and Q_m (Equation 5A.11). After substituting for p from Equation 5A.1 and rearranging terms:

$$Q = (nbe + 2nj - j^2)(a - bd)/D,$$

where $D = (be + 2n - j)(be + j)$. Differentiating this expression for Q with respect to j, we obtain

$$\frac{dQ}{dj} = \frac{2(n - j)(b^2e^2 + nbe)(a - bd)}{D^2} > 0.$$

Because total output increases, price must fall.

Chapter 6

1. A sufficient condition for the Cournot and Bertrand equilibria to be identical is for the market demand curve to be horizontal (perfectly elastic). Another sufficient condition is for there to be an infinite number of firms, so that the elasticity facing any one firm is infinite.
3. It pays for both firms to cooperate and charge the high price. Neither firm has an incentive to deviate from this strategy.
5. The modified table appears at the top of the next page.

Answer to Chapter 6, Problem 5:

Number of Firms	Market Elasticity, ϵ	Lerner's Measure	Consumer Surplus	Social Welfare	Deadweight Loss
2	−1.0833	.4615	115.2	230.4	28.8
5	−.6666	.3	180	252	7.2
10	−.5271	.1884	214.4	257.2	2.0
50	−.4166	.048	249.1	259.1	.1
1,000	−.3903	.0026	258.7	259.2	.0

Chapter 7

1. A franchise or lump-sum tax shifts up a firm's average cost, but not its marginal cost curve. As a result, a franchise tax has no effect on a monopoly unless it causes it to shut down. The quantity that maximizes the before-tax profits maximizes the after-tax profits as well.

   The tax does affect individual competitive firms. If all competitive firms are identical and there is free entry, then, after the tax, firms still in the industry are producing at a higher minimum average cost (reflecting the tax) and a higher quantity. Because the price is higher, less total quantity is consumed; thus, because each firm produces more than without the tax, there are fewer competitive firms.

   The tax also affects monopolistically competitive firms, but the effects are complex and depend on the shapes of the demand and cost curves. Table 7.2 shows what happens with a linear demand curve and a cost function $= mq + F$. For example, if $F =$ \$1.60 and a franchise tax of \$4.80 is applied, the equilibrium number of firms drops from 17 to 8, output per firm doubles from 40 to 80, and the price rises from 32¢ to 36¢. See the answer to Problem 7.5 below for a more formal approach.

3. Table 7.2 shows three monopolistic competition equilibria (for F of \$6.40, \$1.60, and \$0). In the third of these equilibria ($F =$ \$0), there is an infinite number of firms; the competitive price, 28¢, is charged; and output equals 720 (using the demand curve, $Q = 1{,}000 - 1000p$). Where $F =$ \$1.60, there are 17 firms in equilibrium; the price, 32¢, is above the competitive level; and total output is only 680. However, suppose that one more firm were to produce at the same level (40 units) as the existing firms. Output would equal 720, and price would equal MC, 28¢. Similarly, at the equilibrium with $F =$ \$6.40, industry output is 640, and price is 36¢. Yet, if one more firm were to produce at the same level as these firms, industry output would equal 720, where price equals MC. Indeed, it is positive fixed costs that keep the Cournot, monopolistic competition equilibrium from being efficient. Where fixed costs are positive, there is only room for one fewer firm than would make market output equal the competitive output at $F = 0$. There is only room in the sense that if one more firm were to enter, all firms would lose money.

5. A technological innovation that lowers fixed costs has the opposite effect of a franchise tax, discussed in the answer to Problem 7.1 above. A technological change that lowers marginal cost tends to increase output, but the exact effect depends on the shapes of the demand and cost curves.

   Formally, suppose the market demand curve is linear, $p = a - bnq$, where there are n identical firms, each of which produces q units of output with total costs $mq + F$. Each firm's profits are

$$\pi_i = (a - bnq)q - mq - F.$$

   If the firms play Cournot, each firm's profit-maximizing, first-order condition is $MR = MC$:

$$a - b(n + 1)q = m.$$

   Free entry implies that firms enter until price equals average cost $a - bnq = m + F/q$. Combining the first-order condition and the entry condition to eliminate m and rearranging terms yields $q = \sqrt{F/b}$. Thus,

$$\frac{dq}{dF} = \frac{1}{2\sqrt{bF}} > 0.$$

   That is, as F falls, $q = \sqrt{F/b}$ falls in equilibrium, as shown in Table 7.2 and discussed in the answer to

Problem 7.1 above. Using $q = \sqrt{F/b}$ and the free-entry equation,

$$n = \frac{a - m}{\sqrt{bF}} - 1.$$

Differentiating this expression with respect to F, we obtain

$$\frac{dn}{dF} = -\frac{(a - m)}{2F\sqrt{bF}} < 0.$$

Thus, technological progress that lowers F increases the number of firms. The change in total output is

$$\frac{dnq}{dF} = n\frac{dq}{dF} + q\frac{dn}{dF}$$

$$= \frac{2\sqrt{bF} - a + m}{2bF} < 0,$$

using the first-order condition and manipulating. The change in price is $dp/dF = -b(dnq/dF) > 0$. Similarly, $dn/dm < 0$, $dq/dm = 0$, $dnq/dm < 0$, and $dp/dm = 1$.

Chapter 8

1. As commonly measured, the price-cost margin excludes capital and advertising costs. Moreover, even when costs include advertising, the cost measure typically expenses advertising rather than depreciating it (as is proper if advertising effects are long-lasting). It is possible that these sources of bias can be partially offset by including advertising/output and capital/output ratios on the right-hand side of the regression.

   However, it is very likely that this adjustment will not solve the problem. Both ratios are endogenous variables and are chosen simultaneously with price. Therefore, appropriate simultaneous equation econometric techniques should be used. Moreover, it is not always true that including these ratios linearly is appropriate. For example, if advertising depreciation is nonlinear, including advertising-output ratios on the right-hand side of the equation will not remove the bias. Moreover, if rental rates on capital are not constant over time, including capital/output ratios with a single time-independent coefficient is wrong.
3. The domestic concentration ratio based on data from only domestic firms is an upper bound on the relevant concentration ratio if the good is also imported. If imports in an industry increase over time, domestic concentration ratios may become less correlated with price-cost margins, because those industries are increasingly competitive.
5. In a perfectly competitive world, each firm's price equals marginal cost even in the short run. With entry, the profit of the last entrant equals zero. Firms that are relatively efficient earn profits. In a noncompetitive world (for example, one with monopolistic competition), price can exceed marginal cost. With entry, price can remain above marginal cost, but the profit of the last firm to enter typically is driven to zero in the long run.

Chapter 9

1. No producers of aluminum wire can survive. The price of aluminum ingot is so high that there is not enough profit left between the price of aluminum wire and the price of aluminum ingot.
3. Senior citizens may be less costly to serve than others. They may litter the theater less, and their preferences for movies may be easier to predict than those of teenagers, so that there are fewer unsold seats.
5. The first consumer's demand curve forms a rectangle. It is horizontal from zero to 1 unit at \$10 and then drops to zero at 1 unit. The maximum consumer surplus that can be captured is the entire area under the demand curve. The monopoly captures this consumer surplus if it sets its price equal to \$10. Similarly, the monopoly captures all the consumer surplus of the second consumer by charging \$9. There is no consumption inefficiency because there are no further transactions between the consumers that would increase at least one consumer's welfare.

Chapter 10

1. Suppose the coupon entitles the consumer to a 10¢ price reduction, and the consumer has 20 coupons. The firm may want to lower the price to the consumer on 20 units by 10¢ rather than lowering the price on 1 unit by \$2.
3. The consumer's budget constraint is $Y + X^2 = 100$, so that $Y = 100 - X^2$. Utility equals $100 - X^2 + 10X$. The X that maximizes utility is 5.

5. Monopoly 1 maximizes $p_1(10 - 2p_1 + p_2)$ and Monopoly 2 maximizes $p_2(10 + p_1 - 2p_2)$. The two first-order conditions are $10 - 4p_1 + p_2 = 0$ and $10 + p_1 - 4p_2 = 0$. Solving yields $p_1 = p_2 = 10/3$. A monopoly of both products chooses p_1 and p_2 to maximize $p_1(10 - 2p_1 + p_2) + p_2(10 + p_1 - 2p_2)$. The two first-order conditions are $10 - 4p_1 + p_2 + p_2 = 0$ and $p_1 + 10 + p_1 - 4p_2 = 0$. Solving yields $p_1 = p_2 = 5$.
7. If you price each dish separately, you maximize your profit by charging \$11 for the halibut and \$8 for pie. At these prices, Customers *a* and *b* buy only pie and Customer *c* buys only halibut. You earn \$7 = \$8 (price of pie) − \$1 (cost of pie) on each of the two dishes of pie you sell and \$10 on the halibut, for a total profit of \$24. If you only sell a pure bundle, you charge \$12 and earn a profit of \$30 = (\$12 − \$2) × 3, where \$2 is the cost of producing both dishes. Unlike in the example in the text, you cannot do better using mixed bundling (because each customer places a value on each good that is equal to or greater than its marginal cost). Suppose you set the bundle price at \$12, the price of halibut at \$10.99, and the price of pie at \$9.99. Customer *a* buys only the pie (the bundle costs \$2.01 more and that customer only values halibut at \$2), Customer *b* buys the bundle, and Customer *c* buys only the halibut (you sell 2 pies and 2 halibuts). You make \$8.99 from Customer *a*, \$9.99 from Customer *c*, and \$10 from Customer *b* for a total of \$28.98.

Chapter 11

1. Swaps can save transportation costs. If the paper firm in New York had to ship to its California customer and the paper firm in California had to ship to its New York customer, freight costs would be higher than if the firms shipped to the customers located in their own states. Swaps can also facilitate collusion. Suppose two firms collude by assigning customers to each other. This division of the market makes collusion easier because it lowers the cost of detecting a rival's sales to another firm's assigned customers. In the absence of swaps, the assignment of customers to firms may be too costly because of transportation costs.
3. If all firms have a high debt/equity ratio, and if going bankrupt is a blot on a manager's record, then the incentive to cut price is reduced. If firms differ widely in their debt/equity ratios, if new firms can enter, or if the interest rates on debt vary widely across firms, the price level is not likely to be affected by whether a few firms have high debt/equity ratios.
5. The discounted present value of the annual loss of \$1 million is \$8.51 million, using the formula given in the question. The discounted present value of the annual gain of π_m from Year 21 onward is $\$1.49\pi_m$. In order for the gain to exceed the loss, π_m must exceed \$5.7 million.

Chapter 12

1. The profit of a franchisee is $\pi = R(q)(1 - \alpha) - C(q)$, where $R(q)$ is revenues (sales), $C(q)$ is cost, and royalties are a times revenues. The franchisee bears all costs but receives only part of the revenues. Therefore, the franchisee sells less than is optimal. Its first-order condition for profit maximization is $(1 - \alpha)R'(q) = C'(q)$, instead of $R'(q) = C'(q)$. If royalties are β share of (before royalty) profits, $\pi = [R(q) - C(q)](1 - \beta)$. The same q that maximizes preroyalty profits maximizes postroyalty profits. Thus, the franchisee sells the optimal amount. Presumably, franchisers collect royalties as a percent of sales, in spite of this reasoning, because observing profits is more difficult than observing revenues. That is, franchisees may be better able to lie about costs than revenues (see also the answer to Problem 12.5).
3. If a pure profits tax is only collected at the retail level, there is a greater incentive to vertically integrate, even with fixed-proportions production. For example, an integrated firm could charge its own retailer a very high price for the factor it supplies. As a result, profits at the downstream level are relatively low (and hence relatively untaxed), and profits at the upstream level are relatively high. If the tax is collected both upstream and downstream, this incentive is removed. A sales tax at the retail level does not provide a similar incentive to integrate.
5. The franchiser (Kentucky Fried Chicken) uses the number of barrels to check the veracity of its retailers so as to guarantee they pay all the royalties they owe. The only obvious way to avoid this monitoring device is to sell chicken in other containers. Spot checks by the franchiser may discourage this avoidance technique. The argument for allowing this approach is that it facilitates vertical relations.

Chapter 13

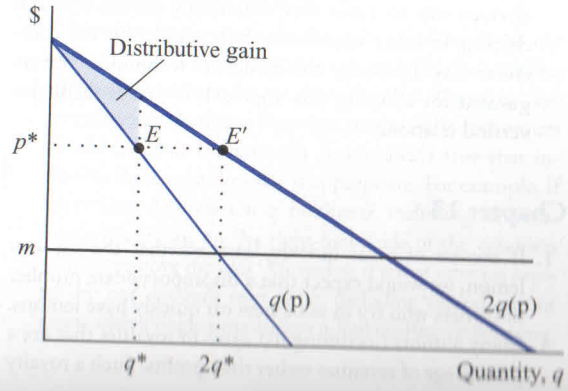
1. If owners of a car quickly learn whether the car is a lemon, we would expect that a disproportionate number of owners who try to sell a new car quickly have lemons.
3. Many authors (including us) agree to royalties that are a percentage of revenues rather than profits. Such a royalty

system gives the publisher the incentive to produce too few books because the publisher incurs the full marginal cost of printing the last book but only gets a fraction of the revenues, $1 - \alpha$. As a result, joint profits are lower than they would be under the other two systems, where the publisher has the incentive to produce the optimal number of books. One possible reason that authors do not want royalties that are a percentage of profits is that they are afraid that the publisher may lie about its costs. Even without lying, authors and publishers could differ about appropriate costs because many costs of publishing are joint costs, and it is hard to allocate costs between various books. You may have read in newspapers that movie actors entitled to a percentage of profits are constantly suing producers who tell them that their hit movie produced no profits because of large costs. Publishers may be hesitant to pay authors lump-sum royalties because authors would then have little incentive to produce products that will sell well. See also the answer to Problem 12.1.

5. A consumer might reasonably infer that the brand name conveys quality. If the banana is of low quality, consumers will avoid this brand in the future. Thus, any firm that plans to remain in the market will only brand its banana if it believes consumers will view it as being better than unbranded bananas.

Chapter 14

1. Shapiro (1980) illustrates his point using an example with two consumers in which each consumer's demand is $q(p)$, and the monopoly produces with constant marginal cost, m. By assumption, before advertising, only one consumer knows about the product, and after advertising, both know it exists. Advertising does not change tastes; it merely informs the unaware consumer that the product exists. The preadvertising demand curve, $q(p)$, is half of the postadvertising demand curve, $2q(p)$, which is the horizontal sum of the demand of the two consumers. The monopoly charges p^* in either case, where p^* maximizes $(p - m)q(p)$ and $(p - m)2q(p)$, because m is constant. In the preadvertising equilibrium, point E in the figure, output is $q^* = q(p^*)$. In the postadvertising equilibrium, E', output is $2q^*$.



In the preadvertising equilibrium, E, only one potential consumer purchases the good, so welfare is the area under the $q(p)$ demand curve between 0 and q^* above m. Advertising has a distributive gain, shown in the accompanying figure by the shaded triangle, which reflects the gain in consumer surplus from informing the other consumer. That is, consumer surplus is the area under the $2q(p)$ demand curve if the two consumers each consume half of the output, instead of having one consumer consume it all and the other, none. Because the monopoly does not capture this gain, it has *too little* incentive to advertise.

3. See Butters (1977) for an analysis of this problem. If firms are advertising that they have low prices, then the analysis is similar to that of the tourist-native model in Chapter 13. It is possible that, in equilibrium, some stores charge high prices and other stores charge low prices.

5. The monopoly's problem is

$$\max_{Q,\alpha} \pi = pQ - mQ - \alpha$$
$$= (a + \alpha - bQ)Q - mQ - \alpha.$$

The first-order conditions are

$$\frac{\partial \pi}{\partial Q} = a + \alpha - 2bQ - m = 0$$

$$\frac{\partial \pi}{\partial \alpha} = Q - 1 = 0.$$

That is, $Q = 1$ and $\alpha = 2b + m - a$.

Chapter 15

1. Let the demand for tractor services be $D(R)$, where R is the rental rate of tractors, and let the elasticity of demand for tractor services be ϵ. The demand for tractors facing the monopoly, $D^*(R)$, is $D(R) - 20$. The elasticity of demand for new tractors, ϵ^*, is then,

$$\frac{dD^*}{dR}\frac{R}{D^*} = \frac{dD}{dR}\frac{R}{D(R) - 20}$$

$$= \frac{dD}{dR}\frac{R}{D(R)}\frac{D(R)}{D(R) - 20}$$

$$= \epsilon\frac{D(R)}{D(R) - 20},$$

because $dD^*/dR = d(D(R) - 20)/dR = dD/dR$. That is, $\epsilon^* = \epsilon(N + O)/N$, where N is the number of new tractors, $D(R) - 20$, and O is the number of old tractors, 20. Holding the elasticity for tractor services, ϵ, constant, then as the ratio of old to new machines, O/N, rises, so does the elasticity for new tractors, ϵ^*.

3. Given high transaction costs, the demand for new tractors is not affected by the stock of old tractors if the farmers who currently need tractors are not the same ones who already own old tractors. However, if the same farmers that need tractors today already own old tractors from before, the analysis is the same as in Problem 15.1.
5. If many other firms make tractors that are close substitutes for the four-wheel-drive tractor produced by a monopoly, then the elasticity for tractor services, ϵ (defined in the answer to Problem 15.1), is high and thus the monopoly has little market power: ϵ^* is high.
7. By so doing, the artist credibly commits not to produce more prints in the future. As a result, the artist can sell the existing prints for more than if the future supply were not so limited.

Chapter 16

1. A sales tax reduces the profits from a monopoly without affecting the costs of research. Because the benefits fall and the costs do not, research effort falls.
3. In Figure 16.1, a longer patent life does not affect the cost curve, but shifts up the expected benefit curve, reflecting the longer time that the patent winner receives monopoly rents. As a result, the expected benefit and cost curves intersect further to the right (larger number of firms). Typically, the number of firms competing increases with patent life.
5. Suppose that each firm that races to make a discovery must incur a fixed cost to enter the race (for example, the expense of setting up a research lab). If there is a constant marginal cost of additional research effort, then each research firm is operating in a region of falling average costs. These fixed costs give society an incentive to reduce the number of research firms if one research firm can conduct many independent projects.

Chapter 17

1. If the bakery produces 50 loaves, it always can sell them at \$5 each. Costs are \$50, so the bakery's profits are \$200. If the bakery produces 100, it incurs costs of \$100 and earns revenues of either \$500 or \$250, or \$375 on average. Hence, its average profits are \$275, and producing 100 is optimal. If the price is \$1.50, when the bakery produces 50 loaves, its profits are \$25. When the bakery produces 100, its revenues are either \$150 or \$75, or \$112.50 on average; its costs are \$100; and its average profit is \$12.50. Hence, producing 50 is optimal. (*Note:* You should be able to show that the optimal output must be 0, 50, or 100 for any given price.)
3. A competitive firm chooses quantity so that price equals marginal cost. As price rises above the shut-down point, the price-average cost margin increases.
5. If it is costly to use the price system, the variability of a customer's demand affects the supplier's cost, and so customers with different demand variabilities pay different prices. There is no price discrimination when prices vary according to costs.

Chapter 18

1. Yes. The authorized wholesale distributor in one country can find it profitable to ship to the other country. By so doing, the distributor avoids paying promotional expenses at home and free rides off the promotional expense of the distributor in the other country. There is no incentive for anyone to buy at retail and ship the product abroad.
3. With no tax, $p_1 = p_2 = 5$, $q_1 = q_2 = 10$, and each firm earns a profit of \$50. With the export tax, buyers pay a price of \$7, firms receive a price (after tax) of \$4, $q_1 = q_2 = 8$, and each firm earns a profit of \$32 (after paying the tax).
5. In the competitive equilibrium, $p = 9$, $Q = 9$. If $t = 2$, $Q = 8$, consumers pay \$10, and the seller receives \$8. The monopsony solution is $Q = 6$, $p = 12$. This same quantity is achieved with a tariff of \$6.

Chapter 19

1. If a customer has signed a contract of fixed duration, rival suppliers are precluded from obtaining (at least some of) the customer's business. If there is competition

initially to sign up the customer, the fact that the contracts last for 10 years does not necessarily prevent the customer from paying a competitive price. If the contracts prevent rivals from reaching a scale required for efficiency, competition could be reduced.

3. Unclear. In some industries, collusion could lead to efficiency gains that outweigh any harm caused by elevated collusive pricing. It may be a difficult task for an enforcement agency to identify such industries, however.
5. The formula says that the direct price elasticity of good i equals (in absolute value) the sum of all cross-elasticities of good i with respect to the price of good j. If a cross-elasticity is large and positive, the price elasticity tends to be large, and market power tends to be low. The relevant cross-elasticity, according to the formula, is the one relating the quantity of Product A to the price of Product B.

Chapter 20

1. In Figure 20.3, at $\underline{p}$, the profits are zero, so $(p_a - p^*)Q_a$ = fixed costs = Areas $A + B$. The consumer surplus, and hence welfare, is the area under the demand curve and above p_a between 0 and Q_a. At $(\underline{p} - p^*)Q_a$, total welfare equals Areas $A + C$ minus $(p_a - p^*)Q_a$. That is, at $\underline{p} = p_a$, total welfare is equal to two triangles, a triangle equal to the consumer surplus at $\underline{p} = p_a$ and a second triangle that lies under the demand curve and above p^* between Q_a and Q^*. Thus, welfare must be higher at $\underline{p} = p^*$ than at $\underline{p} = p_a$.
3. An acreage quota causes farmers to use more of other inputs, such as labor and fertilizer, so that output does not fall as much as acreage. This inefficiency in production leads to deadweight loss. It also causes the supply curve to shift to the left, but by a smaller percentage than acreage falls. Holding the support price constant, the government buys less excessive crops than without acreage controls.
5. One alternative is to give farmers cash. Such a program improves farmers' well-being at lower cost than existing programs. It does not cause the production and distribution inefficiencies described in the chapter.
7. Because of the asymmetry in returns, rate-of-return regulation provides limited incentives to invent. If a firm makes an important discovery that, say, lowers its costs of production, its profit rises less than in proportion to the social gain. If it is unsuccessful in making the discovery, the firm bears the expense and has a lower profit. This problem in an industry with rapid innovation can be reduced if regulators are slow to change the cost basis in calculating the rate of return.