

## Answers to the Problems – Chapter 12

1.
  - a. Substitutes for the U.S. Postal Service include email, fax, and private delivery services, such as FedEx or UPS. Substitutes for Lipitor are other statin drugs, such as Zocor, non-statin drugs that also lower cholesterol, and also exercise. Substitutes for Cox Communications include satellite television services.
  - b. The U.S. Postal Service and Pfizer are protected by legal barriers to entry. The Postal Service has the legal right given to it by the Private Express Statutes to be the only first class non-urgent mail service and Pfizer has a patent on Lipitor. Cox Communications definitely has a natural barrier to entry because it is a natural monopoly.
  - c. Cox Communications is the only natural monopoly. Its cost curve will look similar to Figure 12.1. Cox communications has a large fixed cost of creating a massive infrastructure and then a small marginal cost when it increases the quantity of its customers. As a result, its economies of scale means that its average cost curve is downward sloping when it crosses the demand curve.
  - d. Both the U.S. Postal Service and Pfizer are legal monopolies. The Postal Service has the legal right given to it by the Private Express Statutes to be the only first class non-urgent mail service and Pfizer has a patent on Lipitor
  - e. All three of the firms practice price discrimination. The second ounce in a first class letter is less expensive to mail than the first ounce. Lipitor's price varies according to the insurance policy a customer has. Cox Communications bundles packages of services that have a lower price than each item taken separately so that additional units of service are less expensive than the initial units.
2.
  - a. Minnie's total revenue schedule lists the total revenue at each quantity sold. For example, Minnie's can sell 1 bottle for \$8 a bottle, which is \$8 of total revenue at the quantity 1 bottle.
  - b. Minnie's marginal revenue schedule lists the marginal revenue that results from increasing the quantity sold by 1 bottle. For example, Minnie's can sell 1 bottle for a total revenue of \$8. Minnie's can sell 2 bottles for \$6 each, which is \$12 of total revenue at the quantity 2 bottles. So by increasing the quantity sold from 1 bottle to 2 bottles, marginal revenue is \$4 a bottle (\$12 minus \$8).
  - c. Minnie's demand curve and marginal revenue curve will be similar to those in Figure 12.2. The demand curve will intersect the vertical axis at a price of \$10 and will intersect the horizontal axis at a quantity of 5. The marginal revenue curve will intersect the vertical axis at a price of \$10 and will intersect the horizontal axis at a quantity of 2.5.
  - d. Minnie's marginal revenue is less than her price because to sell an additional unit of output, Minnie must lower her price on all units sold. So when Minnie sells an additional unit of output, her revenue consists of the price she receives for this extra unit *minus* what she loses on all previous units she sells because of the new, lower price.
  - e. Interpolating along the demand curve, Minnie's total revenue is maximized at a price of \$5. At this price she sells 2.5 bottles an hour for a total revenue of \$12.50.
  - f. The demand for Minnie's Mineral Springs water is elastic between \$5 per bottle and \$10 per bottle.
  - g. Minnie will not produce a quantity at which the demand for her water is inelastic because producing at such a price does not maximize her profit. If Minnie is producing where her demand is inelastic, she can decrease the quantity she produces and thereby: 1) increase her total revenue, and 2) decrease her total cost. Because her total revenue increases and her total cost decreases, Minnie's total profit unambiguously increases. Anytime Minnie's production

is at an inelastic point on her demand curve, she can always increase her total profit by decreasing her production.

3. a. Marginal cost is the increase in total cost that results from increasing output by 1 unit. When Minnie's increases output from 1 bottle to 2 bottles, total cost increases by \$4, so the marginal cost is \$4 a bottle.
  - b. Minnie's profit-maximizing output is 1.5 bottles and her profit-maximizing price is \$7 a bottle.  
The marginal cost of increasing the quantity from 1 bottle to 2 bottles is \$4 a bottle (\$7 minus \$3). That is, the marginal cost of the 1.5 bottles is \$4 a bottle. The marginal revenue of increasing the quantity sold from 1 bottle to 2 bottles is \$4 (\$12 minus \$8). So the marginal revenue from 1.5 bottles is \$4 a bottle. Profit is maximized when the quantity produced makes the marginal cost equal to marginal revenue. The profit-maximizing output is 1.5 bottles. The profit-maximizing price is the highest price that Minnie's can sell the profit-maximizing output of 1.5 bottles. Minnie's can sell 1 bottle for \$8 and 2 bottles for \$6, so it can sell 1.5 bottles for \$7 a bottle.
  - c. Minnie's economic profit is \$5.50.  
Economic profit equals total revenue minus total cost. Total revenue equals price (\$7 a bottle) multiplied by quantity (1.5 bottles), which is \$10.50. Total cost of producing 1 bottle is \$3 and the total cost of producing 2 bottles is \$7, so the total cost of producing 1.5 bottles is \$5. Profit equals \$10.50 minus \$5, which is \$5.50.
4. a. The profit-maximizing quantity is 267 newspapers a day and price is 73 cents a paper.  
Profit is maximized when the firm produces the output at which marginal cost equals marginal revenue. Draw in the marginal revenue curve. It runs from 100 on the  $y$ -axis to 500 on the  $x$ -axis. The marginal revenue curve cuts the marginal cost curve at the quantity 267 newspapers a day. The highest price that the publisher can sell 267 newspapers a day is read from the demand curve.
  - b. The daily total revenue is \$194.91 (267 papers at 73 cents each).
  - c. Demand is elastic.  
Along a straight-line demand curve, demand is elastic at all prices above the midpoint of the demand curve. The price at the midpoint is 50 cents. So at 73 cents a paper, demand is elastic.
  - d. The consumer surplus is \$36.05 a day and the deadweight loss is \$8.65 a day.  
Consumer surplus is the area under the demand curve above the price. The price is 73 cents, so consumer surplus equals (100 cents minus 73 cents) multiplied by 267/2 papers a day, which is \$36.05 a day.  
Deadweight loss arises because the publisher does not produce the efficient quantity. Output is restricted to 267 rather than 400, and the price is increased to 73 cents rather than 60 cents. The deadweight loss equals (73 cents minus 60 cents) multiplied by 133/2.
  - e. This market would encourage rent seeking because the producer is earning an economic profit. Other entrepreneurs would like to transfer the economic profit to their pockets and will rent seek in an attempt to do so.
  - f. The quantity would be 400 newspapers per day, the price would be 60 cents per newspaper.  
The consumer surplus is the triangular area under the demand curve and above the price. The price is 60 cents, so consumer surplus equals (100 cents minus 60 cents) multiplied by 400/2 papers a day, which is \$80 a day. The producer surplus is the triangular area under the price and above the supply curve. The price is 60 cents, so producer surplus equals (60 cents minus 20 cents) multiplied by 400/2 papers a day, which is \$80 a day.

5.
  - a. La Belle Pizza is price discriminating, which increases the firm's profit. It is price discriminating along two dimensions. First, it is charging consumers a second price on the second pizza they buy. This sort of price discrimination essentially is moving downward along a consumer's demand curve and increasing the quantity the consumer purchases. Second, it is giving away coupons that lower the price on a stand-priced pizza. La Bella must have consumers with different willingness to pay and the coupon enables La Bella to increase its sales to the coupon users who have a lower willingness to pay for the pizza. On both counts, La Belle is increasing its sales and, because its marginal revenues from these additional sales exceed its marginal cost of \$2, the additional sales increase La Belle's profit.
  - b. The figure will look like Figure 12.9, where some consumers buy pizzas at a price of \$14.99, others buy pizzas at a price of \$9.99 (the \$14.99 regular price minus the \$5 coupon), and still other pizzas are sold for a price of \$4.99.
  - c. La Belle could increase its price discrimination even more. For instance, it might sell a third pizza for \$3.99, which, given the marginal cost of \$2, would still be profitable for La Belle.
  - d. A firm that can price discriminate increases its production relative to what it would produce if it could not price discriminate. So the quantity of pizza La Bella produces is closer to the efficient quantity with the price discrimination than it would be if La Bella did not price discriminate.
6.
  - a. Calypso will produce 2 cubic feet a day and sell it for 6 cents a cubic foot. Draw in the marginal revenue curve. It runs from 10 on the  $y$ -axis to 2.5 on the  $x$ -axis. The profit-maximizing output is 2 cubic feet at which marginal revenue equals marginal cost. The price charged is the highest that people will pay for 2 cubic feet a day, which is 6 cents a cubic foot.
  - b. Calypso will produce 3 cubic feet a day and charge 4 cents a cubic foot. If Calypso is regulated to earn only normal profit, it produces the output at which price equals average total cost—at the intersection of the demand curve and the  $ATC$  curve.
  - c. The firm will produce 4 cubic feet a day and charge 2 cents a cubic foot. If the firm is regulated to be efficient, it will produce the quantity at which price (marginal social benefit) equals marginal social cost—at the intersection of the demand curve and the marginal social cost curve.
7.
  - a. If Calypso is unregulated, it produces 2 cubic feet a day and sells it for 6 cents a cubic foot. The consumer surplus is 4 cents, the producer surplus is 8 cents, and the deadweight loss is 4 cents. The consumer surplus is the triangular area under the demand curve and above the price. The price is 6 cents, so consumer surplus equals  $(10 \text{ cents} - 6 \text{ cents})$  multiplied by  $2/2$  cubic feet a day, which is 4 cents. The producer surplus is the rectangular area under the price and above the  $MC$  curve. The price is 6 cents, so producer surplus equals  $(6 \text{ cents} - 2 \text{ cents})$  multiplied by 2 cubic feet a day, which is 8 cents. The efficient output is 4 cubic feet, at which marginal cost equals price (marginal benefit). The deadweight loss is the triangular area between the demand (or marginal benefit curve) and the marginal cost curve from the equilibrium quantity to the efficient quantity. So the deadweight loss equals  $(4 - 2 \text{ cubic feet})$  multiplied by  $(6 - 2 \text{ cents})/2$ , which is 4 cents a day.
  - b. If Calypso is regulated to make zero economic profit, it produces 3 cubic feet a day and sells it for 4 cents a cubic foot. The consumer surplus is 9 cents, the producer surplus is 6 cents, and the deadweight loss is 1 cent. The consumer surplus is the triangular area under the demand curve and above the price. The price is 4 cents, so consumer surplus equals  $(10 \text{ cents} - 4 \text{ cents})$  multiplied by  $3/2$  cubic feet a day, which is 9 cents. The producer surplus is the rectangular area under the price and

above the *MC* curve. The price is 4 cents, so producer surplus equals (4 cents minus 2 cents) multiplied by 3 cubic feet a day, which is 6 cents. The efficient output is 4 cubic feet, at which marginal cost equals price (marginal benefit). The deadweight loss is the triangular area between the demand (or marginal benefit curve) and the marginal cost curve from the equilibrium quantity to the efficient quantity. So the deadweight loss equals (4 minus 3 cubic feet) multiplied by (4 minus 2 cents)/2, which is 1 cent a day.

- c. If Calypso is regulated to be efficient, it produces 4 cubic feet a day and sells it for 2 cents a cubic foot. The consumer surplus is 16 cents, the producer surplus is 0 cents, and the deadweight loss is 0 cents.

The consumer surplus is the triangular area under the demand curve and above the price. The price is 2 cents, so consumer surplus equals (10 cents minus 2 cents) multiplied by 4/2 cubic feet a day, which is 16 cents. There is no producer surplus because the price equals the marginal cost. And there is no deadweight loss because the quantity produced is the efficient quantity.

## Critical Thinking

1. a. Even though there are many airlines, on some flights an airline can be the only company on that route, thereby giving it a monopoly.
- b. The expansion of low cost carriers into routes previously served by only one (or a very few) other carriers has increased competition and lowered the price. In addition, the Internet has allowed passengers to shop more effectively for lower prices, thereby putting downward pressure on high-priced carriers.
- c. The demand for business travel would be greater in the absence of the Internet. The Internet allows business people to conduct business using teleconferencing rather than flying to meet face-to-face. In addition, the Internet allows business travelers to search for lower prices, which decreases the demand for flights from full-price carriers.
- d. The large price gap exists because the airlines are price discriminating. Because business travelers have a lower elasticity and a higher willingness to pay, the price they are charged exceeds the price charged leisure travelers who have a larger elasticity and a lower willingness to pay.
- e. Your students' answers will depend on their views. However it seems likely that most economists believe that airlines should not be (re-)regulated because these markets are not natural monopolies and because at least some competition exists in the markets.

## Web Activities

1. a. Mr. Nader has several complaints. The main complaints are that
  - “Windows is too expensive.”
  - Microsoft’s pricing strategy when it sells an organization blanket license for Windows and Office makes “it next to impossible for rivals to compete.”
  - Microsoft tries to “undermine its competitor's products.”
- b. Your students' answers will depend on their assessment of the evidence.
- c. Mr. Nader would assert that consumers are “locked into” Windows because there so many applications that work with Windows. Competing operating systems do not have the application base and so are much less useful too consumers.

- d. Mr. Nader lists two major costs to consumers: The price of Microsoft's products is high, according to Mr. Nader higher than they would be if the market was competitive. And the quality of Microsoft's products is low, lower than it would be if the market was competitive.
- 2.
    - a. Intel is not a monopoly because it faces competition from AMD. Indeed, at times such as during 2005, AMD has the technological lead and gained substantial market share. At other times, such as 2006 and 2007, Intel has the lead and gained market share.
    - b. One way that Intel tries to raise barriers to entry to its market is by constant innovation. Intel attempts to rapidly introduce new products, thereby increasing the costs of any potential competitors. Intel also aggressively prices its products, thereby signaling to potential competitors that they will not be able to keep their prices and economic profit high if they choose to compete with Intel.
- 3.
    - a. Heartland Towing has a legal monopoly on towing cars for the city. As far as other towing within the city, Heartland is not a monopoly. The story mentions one competitor by name, Neff Towing, and also mentions that there are six other competitors who could provide temporary service to the city government.
    - b. The story illustrates the pursuit of economic rent and rent seeking. Neff Towing, which had had the contract, was seeking to increase its profit by charging \$95 per tow. But Heartland undercut Neff's rates and bid \$44.80 a tow, slightly under the old rate of \$45 a tow. So competition between Heartland and Neff eliminated the potential economic profit that Neff was attempting to earn.
    - c. It is unlikely that Heartland will earn an economic profit. If Heartland's bid allowed it to earn an economic profit, it is likely that some of the other towing companies would have submitted lower bids in an effort to win the contract. The competition for the contract probably eliminated all the economic profit, leaving the winner only a normal profit.