Monopolies have market power, the ability to affect the market price by changing the total quantity offered for sale. A monopoly is a firm that produces a good or service for which no close substitute exists and which is protected by a barrier that prevents other firms from selling that good or service. Barriers to entry include:

- Control over a key resource.
- Legal barriers to entry (public franchise, government license, or patent) create legal monopolies.
- Natural barriers to entry can lead to natural monopoly, which occurs when economies of scale (which create a downward sloping LRAC curve) are so large that one firm can supply the entire market at lower price than two or more firms.

Monopolists can sell a larger quantity only by charging a lower price. Monopolies can price discriminate or charge a single price.

- Price-discrimination — selling different units of a good for different prices, so some customers pay a lower price than others for the good, or an individual consumer pays a lower price for larger purchases.
- Single-price monopoly — charges the same price to all its customers for every unit of output.

The monopoly firm’s demand curve is the market demand curve. At each level of output, marginal revenue for a monopoly is less than its price ($MR < P$).

In moving down the monopoly’s demand curve:

- when demand is unit elastic, $MR$ is zero and total revenue is at its maximum.
- when demand is inelastic, $MR$ is negative and total revenue falls with output.

A monopoly’s cost curves are similar to those of a competitive firm. A profit-maximizing monopoly produces the output at which $MR = MC$. (This rule is the same used by a competitive firm.) The monopoly uses the demand curve to determine the maximum price that consumers are willing to pay for this quantity of output. Figure 12.1 shows a profit maximizing level of output, 2, and price, $3.

As Figure 12.1 demonstrates, $P$ exceeds $MC$ for a monopoly.

Because $P > ATC$, the single-price monopoly in Figure 12.1 earns an economic profit equal to the area of the shaded rectangle.

Barriers to entry prevent new companies from entering the market, so a monopoly’s economic profit can last indefinitely.
**Single-Price Monopoly and Competition Compared**

Compared to a perfectly competitive industry, a single-price monopoly with the same costs:

- charges a higher price.
- produces less output.

**Figure 12.2**

A Single-Price Monopoly’s Deadweight Loss

Figure 12.2 illustrates these results. If the industry is perfectly competitive, 7,000 units are produced and the price is $40. (The price and quantity are determined by where the demand and supply curves cross.) In comparison, as a single-price monopoly with the same costs, 6,000 units are produced and the price is $50.

With no external costs and benefits, perfect competition is efficient. By restricting its output to be less than that of a competitive industry, a single-price monopoly creates a deadweight loss. The deadweight loss is comprised of lost consumer surplus and producer surplus. Figure 12.2 illustrates the deadweight loss from a single-price monopoly.

**Rent seeking** is any attempt to capture consumer surplus, producer surplus, or economic profit. Rent seekers try to buy or can create a monopoly. Resources used in rent seeking are a cost to society. In equilibrium, rent seeking continues until the economic profit from the monopoly is eliminated.

**Price Discrimination**

Price discrimination occurs when a firm charges different prices for a good. Price discrimination transfers consumer surplus — the value a consumer receives from a good minus the price paid — away from buyers and to the firm, thereby increasing the monopoly’s profit. Price discrimination can occur among units of a good, so that larger orders get a discount, or among groups of buyers, so that some buyers pay a lower price. Price discrimination among groups requires that:

- groups of consumers with different average willingness to pay exist;
- the members of each group are easily identified;
- and, no resales of the good are made from one group to another.

With price discrimination, the group with the high average willingness to pay pays a high price and the group with the low average willingness to pay pays a low price.

**Perfect price discrimination** occurs if a firm is able to sell each unit of output for the highest price anyone is willing to pay for it. Perfect price discrimination extracts all the consumer surplus.

The more perfectly a monopoly can price discriminate, the closer its output is to the competitive level. A perfectly price-discriminating monopoly eliminates all the consumer surplus, but does not result in a deadweight loss, so it is efficient.

**Monopoly Policy Issues**

A monopoly might have some advantages for society:

- It might increase the incentive to innovate, but the empirical evidence on this possible gain is mixed.
- It might be able to capture economies of scale, when an increase in output lowers average total cost, or economies of scope, when an increase in the range of products produced lowers average total cost.

When economies of scale are large enough, a natural monopoly results. Natural monopolies, illustrated in Figure 12.3 (on the next page) are usually regulated by the government.

- Left unregulated, the firm in Figure 12.3 maximizes its profit by charging $P_m$ and producing $Q_m$. 
A **marginal cost pricing rule** requires the firm to set its price equal to its marginal cost. In Figure 12.3, the firm charges $P_{mc}$ and produces $Q_{mc}$. The firm produces the efficient amount of output but incurs an economic loss.

An **average cost pricing rule** requires the firm to set its price equal to its average cost. In Figure 12.3, the firm charges $P_{atc}$ and produces $Q_{atc}$. The firm produces an inefficient amount of output but earns a normal profit.

### Helpful Hints

1. **Why Study Perfect Competition and Monopoly?** The opposite extreme from perfect competition is monopoly. In perfect competition there are many firms that can decide only the quantity they produce but not the price to be charged. In contrast, a monopoly is a single firm that sets both its quantity and price. Understanding the differences between perfect competition and monopoly is valuable because these two industry structures are the ends of the competition spectrum. If competition within an industry heats up, the industry moves closer to behaving like a perfectly competitive industry; if competition dries up, the industry’s output and price approach those of a monopoly.

2. **Understanding Marginal Revenue for a Monopoly:** In a monopoly, there is only one firm, so the downward sloping market demand curve is also the firm’s demand curve. If a single-price monopoly wants to sell one more unit of output, it must lower its price. Selling another unit thus has two effects on revenue:
   - First, the sale of an additional unit raises revenue by the amount of the (new, lower) price. If this effect was the sole effect, the marginal revenue would equal the price. (This effect is the only one for a perfectly competitive firm, so for these firms marginal revenue equals the price.)
   - Second, because the firm also lowers the price on all the units it had previously sold, revenue from these units falls. (This effect is absent from a perfectly competitive firm because it does not need to lower its price in order to sell an additional unit of output.)

By itself, the first effect yields marginal revenue equal to the price, but the second effect subtracts from the first. Hence marginal revenue is less than the price. Therefore, for a monopoly, the marginal revenue curve lies below the demand curve.

3. **The “MR = MC” Rule to Maximize Profits:** To maximize its profit, a monopoly produces the level of output such that $MC = MR$. This rule is the same one followed by a perfectly competitive firm. Any profit-maximizing firm will produce a unit of output if $MR > MC$ because the added revenue from the unit, the marginal revenue, exceeds the added cost, the marginal cost. As a result, producing this unit adds to the firm’s total profit. Similarly, any profit-maximizing firm will not produce a unit of output if $MR < MC$ because producing the unit reduces the firm’s total profit. Hence regardless of whether the firm is a monopoly or perfectly competitive, it produces at the level of output that sets $MR = MC$.

### Questions

#### True/False and Explain

**Market Power**

1. Barriers to entry are essential to a monopoly.
2. Patents grant the patent owner a legal monopoly.
3. A single-price monopoly charges each consumer the highest single price the consumer will pay.

**Single-Price Monopoly’s Output and Price Decisions**

4. A difference between a perfectly competitive firm and a monopoly is that the monopolist’s decisions about how much to produce affect the good’s price.

5. For a single-price monopoly, marginal revenue, $MR$, equals price, $P$.

6. To maximize their profits, both monopolies and perfectly competitive firms produce the level of output that sets $MR = MC$.

7. When a single-price monopoly is maximizing its profit, $P > MC$.

8. A monopoly can earn an economic profit indefinitely.

**Single-Price Monopoly and Competition Compared**

9. Monopolies decrease the deadweight loss from perfectly competitive industries.

10. In moving from perfect competition to single-price monopoly, all the surplus lost by consumers is captured by the monopoly.

11. Rent seeking is a cost to society of monopoly.

**Price Discrimination**

12. Price discrimination is an attempt by a monopolist to capture the producer surplus.

13. If a monopoly can successfully price discriminate, it can increase its profit.

14. Compared to a single-price monopoly, a price-discriminating monopoly reduces the amount of consumer surplus.

15. Price discrimination works only for goods that can be resold.

**Monopoly Policy Issues**

16. There are no possible benefits to society from a monopoly.

17. A natural monopoly is a firm that controls a vital natural resource.

18. A marginal cost pricing rule imposed on a natural monopoly creates an efficient use of resources.

![Multiple Choice](#)

**Market Power**

1. Suppose that one taxi company in your city is granted a license by the city so that it is the only cab company that may operate within the city limits. Granting this license is an example of a

   a. natural barrier to entry.
   b. case in which a single firm controls a resource necessary to produce the good.
   c. price-discriminating monopoly.
   d. legal barrier to entry.

2. Which of the following is a natural barrier to the entry of new firms in an industry?

   a. Licensing
   b. Economies of scale
   c. Issuing a patent
   d. Granting a public franchise

3. In order to sell more output, a single-price monopoly must ____ its price and a price-discriminating monopoly must ____ its price.

   a. raise; raise
   b. raise; lower
   c. lower; raise
   d. lower; lower

**Single-Price Monopoly’s Output and Price Decisions**

4. Max’s Christmas tree lot has a monopoly on sales of Christmas trees. To increase his sales from 100 trees to 101 trees, he must drop the price of all his trees from $28 to $27. What is Max’s marginal revenue when he lowers his price and increases his sales from 100 to 101 trees?

   a. $2,800
   b. $28
   c. $27
   d. –$73

5. A monopolist finds that when it produces 20 units of output, its demand is elastic. At this level of output, its marginal revenue necessarily is positive.

   a. its marginal revenue necessarily is positive.
   b. its marginal revenue necessarily is zero.
   c. its marginal revenue necessarily is negative.
   d. none of the above is correct because the marginal revenue does not depend upon the elasticity of demand.
6. A monopolist finds that the marginal revenue from producing another unit of output exceeds the marginal cost of the unit. Then, to increase its profit, the monopolist will
   a. produce the unit.
   b. not produce the unit, but not cut back its production at all.
   c. not produce the unit and cut back its production by at least one unit.
   d. do none of the above.

7. If a monopoly is producing a level of output such that marginal cost exceeds marginal revenue, to increase its profits the firm
   a. should raise its price and decrease its output.
   b. should lower its price and increase its output.
   c. should lower its price and decrease its output.
   d. none of the above because the firm is incurring an economic loss and it cannot alter this fact.

8. Which of the following is true for a single-price monopoly?
   a. Price always equals marginal cost, that is, \( P = MC \) at all levels of output.
   b. For all levels of output, price equals marginal revenue, that is, \( P = MR \).
   c. In the short run, the monopoly might earn a normal profit or incur an economic loss.
   d. None of the above because all the statements are false.

9. A single-price monopolist will maximize its profits if it produces the amount of output such that
   a. price equals marginal cost, that is, \( P = MC \).
   b. price equals marginal revenue, that is, \( P = MR \).
   c. marginal revenue equals marginal cost, that is, \( MR = MC \).
   d. price equals average total cost, that is, \( P = ATC \).

10. Because of an increase in labor costs, a monopoly finds that its \( MC \) and \( ATC \) have risen. Presuming that the monopoly does not shut down, it will _____ its price and _____ the quantity it produces.
    a. raise; increase
    b. raise; decrease
    c. lower; increase
    d. lower; decrease

11. In Figure 12.4, a profit-maximizing single-price monopoly will produce
    a. \( Q_1 \).
    b. \( Q_2 \).
    c. \( Q_3 \).
    d. None of the above.

12. In Figure 12.4, a profit-maximizing single-price monopoly will set a price of
    a. \( P_1 \).
    b. \( P_2 \).
    c. \( P_3 \).
    d. \( P_4 \).

13. In the short run a monopoly can
    a. earn only an economic profit.
    b. earn only an economic profit or a normal profit.
    c. earn only a normal profit.
    d. earn an economic profit, or a normal profit, or incur an economic loss.

14. A monopoly might be able to earn an economic profit
    a. only in the short run.
    b. only in the long run.
    c. indefinitely, that is, in both the short run and the long run.
    d. The premise of the question is wrong because a monopoly can never earn an economic profit.
Single-Price Monopoly and Competition Compared

15. Compared to a perfectly competitive industry with the same cost, the amount of output produced by a single-price monopoly is
   a. more than the competitive industry.
   b. the same as the competitive industry.
   c. less than the competitive industry.
   d. not comparable to the competitive industry.

16. Compared to a perfectly competitive industry, the price charged by a single-price monopoly with the same costs is
   a. more than the competitive industry.
   b. the same as the competitive industry.
   c. less than the competitive industry.
   d. not comparable to the competitive industry.

Figure 12.5 illustrates a single-price monopoly. Use it for the next three questions

**FIGURE 12.5**

Multiple Choice Questions 17, 18, 19

17. The deadweight loss in Figure 12.5 is the area
   a. abc.
   b. bcd.
   c. bcfg.
   d. beh.

18. The consumer surplus in Figure 12.5 is the area
   a. abc.
   b. bcd.
   c. bcfg.
   d. beh.

19. The economic profit in Figure 12.5 is the area
   a. abc.
   b. bcd.
   c. bcfg.
   d. beh.

20. If a perfectly competitive industry becomes a single-price monopoly and costs do not change, which of the following allocations of costs and benefits is correct?
   a. The producer benefits; demanders and society are harmed.
   b. The producer and society are harmed; demanders benefit.
   c. The producer, demanders, and society are harmed.
   d. The producer is harmed but demanders and society benefit.

21. If a single-price monopoly is broken up so that it becomes a perfectly competitive industry and costs do not change, which of the following statements describing the costs and benefits is correct?
   a. The producer benefits; demanders and society are harmed.
   b. The producer and society are harmed; demanders benefit.
   c. The producer, demanders, and society benefit.
   d. The producer is harmed; demanders and society benefit.

22. Activity for the purpose of creating a monopoly is
   a. not legal in the United States.
   b. called rent seeking.
   c. called price discrimination.
   d. called legal monopoly.

**Price Discrimination**

23. In order to successfully price discriminate, a firm must be able to
   a. reduce its MC.
   b. distinguish between customers who have different willingness to pay.
   c. encourage many resales of its good among its customers.
   d. exert a non-price control over the number of demanders who will buy its good.
24. Price discrimination allows a monopoly to
   a. lower its marginal cost.
   b. reduce its producer surplus.
   c. increase its total revenue.
   d. charge all customers a higher price.

25. A monopoly that is able to perfectly price discriminate
   a. charges everyone the lowest price that they want to pay for each unit purchased.
   b. produces less output than it would were it a single-price monopoly.
   c. eliminates consumer surplus.
   d. creates a larger deadweight loss than it would if it were a single-price monopoly.

26. A monopoly movie theater discovers that the average willingness to pay for watching movies is higher at 8 P.M. than at 5 P.M. As a result, if a monopoly movie theater wants to price discriminate and earn a larger profit, it charges
   a. a higher price at 8 P.M.
   b. the same price at 5 P.M. as at 8 P.M.
   c. a lower price at 8 P.M.
   d. There is not enough information given to answer the question.

27. Business travelers usually pay higher airline fares than families on a vacation. So,
   a. business travelers aren’t maximizing their utility.
   b. business travelers have a higher willingness to pay than do vacation travelers.
   c. the MC of serving vacation travelers is lower than that of serving business travelers.
   d. vacation travelers have a greater demand for air travel than do business travelers.

**Monopoly Policy Issues**

28. Which of the following situations might be a gain to society from monopoly?
   a. Monopolies do not waste resources trying to innovate.
   b. Monopolies might be able to capture economies of scale.
   c. Monopolies might be able to price discriminate, thereby boosting consumer surplus.
   d. Monopolies might earn an economic profit in the long run.

29. A monopoly has economies of scope if
   a. average total cost declines as output decreases.
   b. average total cost declines as output increases.
   c. total profit declines as output increases.
   d. average total cost declines as the number of different goods produced increases.

30. A natural monopoly
   a. is usually regulated by the government.
   b. earns an economic profit if it must use a marginal cost pricing rule.
   c. has an average total cost curve that is positively sloped until it crosses the demand curve.
   d. has a demand curve that is positively sloped.

**Short Answer**

1. Why is marginal revenue less than price for a single-price monopoly?

2. In a small college town, Laura’s Bookstore has a monopoly in selling textbooks. Laura’s fixed costs are $100, and her total costs are shown in Table 12.1.
   a. Complete Table 12.1 by computing average total cost and marginal cost.

<table>
<thead>
<tr>
<th>Quantity (books per hour)</th>
<th>Total cost (dollars)</th>
<th>Average total cost (ATC)</th>
<th>Marginal cost (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>247.00</td>
<td>27.44</td>
<td>9.00</td>
</tr>
<tr>
<td>10</td>
<td>256.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>267.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>280.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>295.00</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td>312.00</td>
<td></td>
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<tr>
<td>15</td>
<td>331.00</td>
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<td>16</td>
<td>352.00</td>
<td></td>
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<tr>
<td>17</td>
<td>375.00</td>
<td></td>
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<tr>
<td>18</td>
<td>400.00</td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>427.00</td>
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<tr>
<td>20</td>
<td>456.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>487.00</td>
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</tbody>
</table>
b. Table 12.2 lists points on the demand curve facing Laura’s Bookstore. Copy the marginal costs from Table 12.1 and complete the table.

c. What is Laura’s profit-maximizing quantity of output? At what price will she sell her books? What is her total economic profit?

d. In Figure 12.6, plot the demand curve and the $MR$, $ATC$, and $MC$ curves corresponding to the data in parts (a) and (b). Show the equilibrium output and price. On your diagram, illustrate the area that equals Laura’s economic profit.

**TABLE 12.2**

<table>
<thead>
<tr>
<th>Quantity demanded (books per hour)</th>
<th>Price (dollars per book)</th>
<th>Total revenue (dollars)</th>
<th>Marginal revenue ($MR$)</th>
<th>Marginal cost ($MC$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>57.00</td>
<td>513.00</td>
<td>47.00</td>
<td>9.00</td>
</tr>
<tr>
<td>10</td>
<td>56.00</td>
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<td>11</td>
<td>55.00</td>
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<td>13</td>
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<td>14</td>
<td>52.00</td>
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<td>15</td>
<td>51.00</td>
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<td>16</td>
<td>50.00</td>
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<td>49.00</td>
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<td>19</td>
<td>47.00</td>
<td>___</td>
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<td>20</td>
<td>46.00</td>
<td>___</td>
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<tr>
<td>21</td>
<td>45.00</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

3. a. Laura’s cost curves are unchanged from problem 2, but now consumers decrease their demand. Table 12.3 lists some points on the new demand curve. Complete the table by copying the marginal costs from Table 12.1, and by computing the new total revenue and marginal revenue.

b. What is Laura’s new profit-maximizing quantity of output? At what price does she now sell her books? What is her total profit? Explain your answers.

**TABLE 12.3**

<table>
<thead>
<tr>
<th>Quantity demanded (books per hour)</th>
<th>Price (dollars per book)</th>
<th>Total revenue (dollars)</th>
<th>Marginal revenue ($MR$)</th>
<th>Marginal cost ($MC$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>24.50</td>
<td>220.50</td>
<td>19.50</td>
<td>9.00</td>
</tr>
<tr>
<td>10</td>
<td>24.00</td>
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<td>23.50</td>
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<td>23.00</td>
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<td>13</td>
<td>22.50</td>
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<td>14</td>
<td>22.00</td>
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<td>15</td>
<td>21.50</td>
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<td>16</td>
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<tr>
<td>21</td>
<td>18.50</td>
<td>___</td>
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</tr>
</tbody>
</table>
4. In Figure 12.7 label the curves. Show the amount this single-price monopolist will produce and the price it will charge. Indicate the firm’s economic profit and show the deadweight loss created.

5. Why can a monopoly — but not a perfectly competitive firm — earn an economic profit in the long run?

6. Explain why the output of a perfectly competitive industry is greater than the output of the same industry if it is a single-price monopoly.

7. Derek is the owner of the only movie theater in town. By hiring several well-trained economists, Derek learns that the people watching movies after 8 P.M. have a much higher average willingness to pay than people watching at 5 P.M. The costs of showing a movie are identical at 5 P.M. and 8 P.M. To maximize his profit, what should Derek do? Give him some specific advice, including drawing him a diagram or two. (Derek can get his economists to interpret your diagrams as long as you label all the axes and all the curves.)

8. Suppose that your city grants one pizza delivery service a legal monopoly on delivering pizzas; all other pizza delivery services must close.
   a. What will happen to the price and quantity of delivered pizzas?
   b. What will happen to the profit of the owner who has been granted the monopoly?
   c. Suppose that the owner offers to sell the pizza delivery company to you. Would you be able to earn an economic profit? Be careful when you answer this question; think about the price the previous owner will charge you for the business.

9. Three industries have the same market demand and identical cost curves. Industry A is perfectly competitive, industry B is a single-price monopoly, and industry C is a monopoly able to perfectly price discriminate.
   a. Draw a figure showing the (downward sloping) market demand curve (label it \( D \)); the marginal revenue curve (label it \( MR \)); the marginal cost curve (label it \( MC \)); and the average total cost curve (label it \( ATC \)).
   b. In the figure, identify how much each industry produces by labeling the outputs as \( Q_A \), \( Q_B \), and \( Q_C \) for industry A, B, and C, respectively.
   c. In which industry or industries is consumer surplus the largest? The smallest?
   d. In the long run, in which industry or industries is the total economic profit the largest? The smallest?
   e. Which industry structure(s) are efficient?

10. What is rent seeking? Why does rent seeking occur in a monopoly industry, but not in a perfectly competitive industry?

You’re the Teacher

1. “I don’t really understand how monopoly firms decide how much to produce and what price to charge. Can you give me some help? I’d really like just a rule or two to remember.” Because you have studied this material, you are in a position to help this student. Offer a couple of rules that this student can use to determine, first, how much is produced, and second, what price is charged.

2. “How does price discrimination reduce the amount of consumer surplus? I mean, by price discriminating the company charges some people a lower price, so how can this reduce consumer surplus?” These questions are short and to the point, so give a similar answer to them!
Answers

True/False Answers

Market Power
1. T Without barriers to entry, other firms will enter the industry so that it no longer is a monopoly.
2. T Patents legally prohibit anyone else from producing the same good.
3. F A single-price monopoly charges each consumer the same price.

Single-Price Monopoly’s Output and Price Decisions
4. T The monopolist is the only producer in the market, so the monopolist’s decisions about how much to produce determine the market price.
5. F For a single-price monopoly, \( P > MR \).
6. T No matter its industry type, a firm producing so that \( MR = MC \) earns the maximum profit.
7. T A single-price monopoly produces at \( MR = MC \). Because \( P > MR \), the equality between \( MR \) and \( MC \) means that \( P > MC \).
8. T Barriers to entry limit the competition faced by the monopoly, so it is able to earn an economic profit indefinitely.

Single-Price Monopoly and Competition Compared
9. F A monopoly creates deadweight loss; it does not reduce it.
10. F Single-price monopolists capture only part of the consumer surplus. They create deadweight loss, part of which is the consumer surplus lost to everyone in society.
11. T Rent seeking refers to the use of resources to establish a monopoly.

Price Discrimination
12. F Price discrimination captures consumer surplus, not producer surplus.
13. T This motivation lies behind price discrimination.
14. T Effectively, the price-discriminating monopolist converts consumer surplus into additional economic profit for itself.
15. F Price discrimination requires goods that cannot be resold.

Monopoly Policy Issues
16. F Monopolies might be able to capture more economies of scale or scope than competitive firms. And, monopolies might have a greater incentive to innovate than competitive firms.
17. F A natural monopoly is a firm that enjoys such economies of scale that it can supply the entire market at lower cost than could two (or more) firms.
18. T However, a marginal cost pricing rule might mean that the firm incurs an economic loss.

Multiple Choice Answers

Market Power
1. d The taxi company has been granted a legal monopoly.
2. b The other possibilities are legal barriers to entry.
3. d All monopolies must lower their price in order to sell more output.

Single-Price Monopoly’s Output and Price Decisions
4. d Total revenue when 100 trees are sold is $2,800; when 101 trees are sold, it is $2,727. Hence the marginal revenue from the 101st tree is $-73.
5. a When demand is elastic, \( MR \) is positive; when demand is inelastic, \( MR \) is negative.
6. a As long as \( MR \) exceeds \( MC \), producing the unit adds to the firm’s total profit because it adds more to revenue than to cost.
7. a Output should be decreased because the last units produced lower the firm’s profit and, by reducing output, the firm can raise its price.
8. c Like any firm, if demand for its good declines or its costs rise, in the short run a monopoly might earn a normal profit or incur an economic loss.
9. c All firms maximize their profit by producing the amount of output so that \( MR = MC \).
10. b The rise in marginal costs shifts the \( MC \) curve leftward. The firm thus decreases the quantity it produces and raises the price it charges.
11. b The firm produces the level of output that sets \( MR = MC \).
12. c The firm produces \( Q_2 \) of output. The highest price the firm can charge and sell this amount of output is \( P_3 \).
13. d In the short run, depending on demand and cost, any firm can earn an economic profit, a normal profit, or incur an economic loss.

14. c A monopoly might be able to earn an economic profit and, because of the barriers to entry, the economic profit can last indefinitely.

**Single-Price Monopoly and Competition Compared**

15. c A single-price monopoly creates a deadweight loss because it produces less than a competitive industry.

16. a Because it produces less output, the monopoly is able to boost the price it charges.

17. d The deadweight loss is created because a single-price monopoly produces less than a perfectly competitive industry.

18. a The consumer surplus is the area between the demand curve and the price.

19. c The economic profit is the area of the rectangle with its height the difference between \( P \) and \( ATC \) and with its length the quantity produced.

20. a The producer benefits because the monopoly can earn an economic profit; consumers lose because of the reduction in consumer surplus; and society loses due to the deadweight loss.

21. d This answer is the reverse of the previous answer and shows that society benefits from breaking up a monopoly.

22. b The question defines rent seeking.

**Price Discrimination**

23. b The firm must be able to distinguish between high and low willingness to pay customers in order to determine who should be charged a high price and who a low price.

24. c The monopoly raises its total revenue by capturing some consumer surplus.

25. c Any price discrimination eliminates some consumer surplus and perfect price discrimination eliminates it all.

26. a Customers with a high average willingness to pay are charged a higher price.

27. b Airlines price discriminate and charge business travelers, who have a high average willingness to pay, more than vacation travelers, who have a low average willingness to pay.

**Monopoly Policy Issues**

28. b If economies of scale are large enough, a monopoly might produce more than a competitive industry.

29. d The answer defines economies of scope.

30. a Natural monopolies, such as electric power distributors and local telephone companies, are usually regulated by the government.

**Answers to Short Answer Problems**

1. To sell an additional unit of output, a monopoly must lower its price. The additional unit sold at the lower price adds to the firm’s revenue an amount equal to the price. But a single-price monopoly also lowers the price to previous customers who had been paying more. Marginal revenue equals the new revenue, the new price, minus the loss of revenue from lowering the price to previous customers, so marginal revenue is less than the price.

<table>
<thead>
<tr>
<th>Quantity (books per hour)</th>
<th>Total cost (dollars)</th>
<th>Average total cost (ATC)</th>
<th>Marginal cost (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>247.00</td>
<td>27.44</td>
<td>9.00</td>
</tr>
<tr>
<td>10</td>
<td>256.00</td>
<td>25.60</td>
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<td>11</td>
<td>267.00</td>
<td>24.27</td>
<td>13.00</td>
</tr>
<tr>
<td>12</td>
<td>280.00</td>
<td>23.33</td>
<td>15.00</td>
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<tr>
<td>13</td>
<td>295.00</td>
<td>22.69</td>
<td>17.00</td>
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<tr>
<td>14</td>
<td>312.00</td>
<td>22.29</td>
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<td>22.00</td>
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<td>17</td>
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<td>400.00</td>
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<tr>
<td>21</td>
<td>487.00</td>
<td>23.19</td>
<td></td>
</tr>
</tbody>
</table>

2. a Table 12.4 shows the average total costs and marginal costs. The average total costs are calcu-
lated by dividing the total costs by the total outputs. For instance, the average total cost when 10 books are sold is $256 ÷ 10, or $25.60. The rest of the ATCs are calculated similarly. Marginal cost equals the change in the total cost divided by the change in output. For example, the marginal cost going from 10 to 11 units of output is ($267 − $256) ÷ (11 − 10), which equals $11.00. The remainder of the MCs are calculated in the same way.

Table 12.5
Short Answer Problem 2 (b)

<table>
<thead>
<tr>
<th>Quantity demanded (books per hour)</th>
<th>Price (dollars per book)</th>
<th>Total revenue (dollars)</th>
<th>Marginal revenue (MR)</th>
<th>Marginal cost (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>57.00</td>
<td>513.00</td>
<td>47.00</td>
<td>9.00</td>
</tr>
<tr>
<td>10</td>
<td>56.00</td>
<td>560.00</td>
<td>45.00</td>
<td>11.00</td>
</tr>
<tr>
<td>11</td>
<td>55.00</td>
<td>605.00</td>
<td>43.00</td>
<td>13.00</td>
</tr>
<tr>
<td>12</td>
<td>54.00</td>
<td>648.00</td>
<td>41.00</td>
<td>15.00</td>
</tr>
<tr>
<td>13</td>
<td>53.00</td>
<td>689.00</td>
<td>39.00</td>
<td>17.00</td>
</tr>
<tr>
<td>14</td>
<td>52.00</td>
<td>728.00</td>
<td>37.00</td>
<td>19.00</td>
</tr>
<tr>
<td>15</td>
<td>51.00</td>
<td>765.00</td>
<td>35.00</td>
<td>21.00</td>
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<tr>
<td>16</td>
<td>50.00</td>
<td>800.00</td>
<td>33.00</td>
<td>23.00</td>
</tr>
<tr>
<td>17</td>
<td>49.00</td>
<td>833.00</td>
<td>31.00</td>
<td>25.00</td>
</tr>
<tr>
<td>18</td>
<td>48.00</td>
<td>864.00</td>
<td>29.00</td>
<td>27.00</td>
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<tr>
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<td>47.00</td>
<td>893.00</td>
<td>27.00</td>
<td>29.00</td>
</tr>
<tr>
<td>20</td>
<td>46.00</td>
<td>920.00</td>
<td>25.00</td>
<td>31.00</td>
</tr>
<tr>
<td>21</td>
<td>45.00</td>
<td>945.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Table 12.5 gives the total revenue and marginal revenue. Total revenue is (Quantity) × (Price). By way of example, the total revenue at the quantity of 10 books is (10) × ($56) = $560. After finishing with the total revenue, the marginal revenue can be calculated as the change in total revenue divided by the change in output. Take the marginal revenue going from 10 to 11 books sold per hour as an example. This marginal revenue equals ($605 − $560) ÷ (11 − 10), or $45. The rest of the marginal revenues are computed the same way.

c. To maximize her profit, Laura produces at $MR = MC$. Between 18 and 19 books the marginal revenue is $29 and between 19 and 20, it is $27. So, at 19 books the marginal revenue is $28. Similarly, the marginal cost is $27 between 18 and 19 books and $29 between 19 and 20 books, which indicates that at 19 books the marginal cost is $28. Marginal revenue equals marginal cost at an output of 19 books, so this quantity is the profit-maximizing level of output.

The data for the demand curve show that Laura can sell 19 books at a price per book of $47, so the monopoly price is $47 per book. (Note that the price, $47, is greater than the marginal cost, $28.) Laura’s economic profit equals her total revenue minus her total cost. From Table 12.5, the total revenue when selling 19 books is $893, and, from Table 12.4, the total cost of selling 19 books is $427. Laura’s total economic profit is $893 − $427 = $466.

d. Figure 12.8 shows the demand, $MR$, and cost curves. The area of the darkened rectangle equals Laura’s economic profit.

Figure 12.8
Short Answer Problem 2 (d)
TABLE 12.6
Short Answer Problem 3 (a)

<table>
<thead>
<tr>
<th>Quantity (books per hour)</th>
<th>Price (dollars per book)</th>
<th>Total Revenue (dollars)</th>
<th>Marginal Revenue (MR)</th>
<th>Marginal Cost (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>24.50</td>
<td>220.50</td>
<td>19.50</td>
<td>9.00</td>
</tr>
<tr>
<td>10</td>
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<td>240.00</td>
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<tr>
<td>11</td>
<td>23.50</td>
<td>258.50</td>
<td>17.50</td>
<td>13.00</td>
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<tr>
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<td>23.00</td>
<td>276.00</td>
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<tr>
<td>13</td>
<td>22.50</td>
<td>292.50</td>
<td>15.50</td>
<td>17.00</td>
</tr>
<tr>
<td>14</td>
<td>22.00</td>
<td>308.00</td>
<td>14.50</td>
<td>19.00</td>
</tr>
<tr>
<td>15</td>
<td>21.50</td>
<td>322.50</td>
<td>13.50</td>
<td>21.00</td>
</tr>
<tr>
<td>16</td>
<td>21.00</td>
<td>336.00</td>
<td>12.50</td>
<td>23.00</td>
</tr>
<tr>
<td>17</td>
<td>20.50</td>
<td>348.50</td>
<td>11.50</td>
<td>25.00</td>
</tr>
<tr>
<td>18</td>
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<td>360.00</td>
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<td>27.00</td>
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<td>19.00</td>
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</tr>
<tr>
<td>21</td>
<td>18.50</td>
<td>388.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Marginal revenue schedules are calculated similarly to those in Table 12.5.

b. After the decrease in demand, Laura finds that \( MR = MC \) when she sells 13 books per hour. (The \( MR \) equals $16, the same as the \( MC \).) So, 13 books is the profit-maximizing level of sales. When Laura sells 13 books per hour, the (new) demand schedule shows that she can charge $22.50 per book and sell all 13. Hence the new profit-maximizing price is $22.50 per book. Laura’s economic profit equals her total revenue of $292.50 minus her total cost of $295.00. Hence her “profit” is −$2.50; that is, with the decrease in demand, Laura actually incurs an economic loss of $2.50. Table 12.6 indicates that this loss is the minimum possible loss. Laura will continue to operate in the short run because this loss is less than her shut-down loss, which would be $100, the amount of the business’s fixed cost. In the long run, however, if matters do not improve, Laura will close down as soon as at least $97.51 of her (current) fixed cost becomes a variable cost.

Figure 12.9
Short Answer Problem 4

4. All the curves are labeled in Figure 12.9. Also illustrated in the figure is the economic profit (the darker rectangle) the monopoly earns and the deadweight loss (the lighter triangular area) the monopoly creates.

5. The fundamental reason that monopolies are able to earn an economic profit in the long run is that they are protected from competition by barriers to entry. Essentially when the monopolist is earning an economic profit, other firms would like to enter that market. However, they are precluded from doing so by the existence of barriers to entry — some feature of the market, be it economies of scale or perhaps a patent, that prevents new firms from entering the industry. Perfectly competitive firms are not protected by barriers to entry. If they are earning an economic profit, new competitors will enter the market and, by so doing, compete away the economic profit. Hence it is the barriers to entry that allow a monopoly to indefinitely earn an economic profit.

6. A perfectly competitive industry produces the level of output at which the industry’s marginal cost curve (which is the same as the industry’s supply curve) intersects the industry’s demand curve. A single-price monopoly produces the level of output at which the industry’s (the firm’s) marginal cost curve intersects the monopoly’s marginal revenue curve. Because the marginal revenue curve lies below the demand curve, the monopoly industry pro-
duces less. More intuitively, compared to a perfectly competitive industry, a single-price monopoly restricts its output in order to raise its price and generate an economic profit.

7. In order to maximize his profits, Derek should charge a lower price for his 5 o’clock movies and a higher price for his 8 o’clock movies. In other words, Derek should price discriminate because by so doing, Derek increases his profit.

Price discrimination is possible because this situation easily fulfills its requirements. First, Derek can readily distinguish between customers with a high average willingness to pay and those with a low average willingness to pay by noting when they want to see the movie: those who want to view at 8 P.M. have a higher average willingness to pay than those who want to view at 5 P.M. Second, to resell the good is impossible; that is, people attending at 5 P.M. are not going to be able to resell viewing the movie to those who want to attend at 8 P.M. Thus Derek can “separate” his market into two groups and charge the 5 P.M. group a low price and the 8 P.M. group a higher price.

Why does price discrimination increase Derek’s profit? Figures 12.10 and 12.11 shed light on this question. The marginal cost of showing a movie at 5 P.M. or at 8 P.M. is assumed to be constant. In order to maximize his profit in the 5 o’clock market, Derek equates $MR$ to $MC$ and sells $Q_L$ (“L” for “low willingness to pay”) tickets by charging $P_L$. In the high willingness to pay, 8 P.M. market, Derek sells $Q_H$ (“H” for “high willingness to pay”) tickets by charging $P_H$ per ticket. By charging a lower price at 5 P.M. and a higher price at 8 P.M., Derek is able to convert into economic profit some of the consumer surplus that would result if he charged both classes of customers the same price. Price discrimination raises Derek’s economic profit.

8. a. When the one firm is granted a monopoly on pizza delivery, it boosts its price and thereby reduces its output. The price of a pizza will rise, the quantity of pizzas delivered will decrease, and so the quantity of pizzas consumed decreases as fewer pizzas are delivered.

b. The owner of the (new) monopoly pizza delivery service will earn an economic profit.

c. Perhaps surprisingly, though you might be rent seeking by offering to buy the delivery service, you will not be able to earn an economic profit. Why not? Think of the selling price the pizza owner will charge to buy the pizza delivery company and its monopoly. The selling price must compensate the owner for all the economic profit that he or she will lose in the future by not owning the business. Hence the price of the business will rise with the economic profit that it is earning, both now and in the future. The fact
that the price of the business rises means that you will be able to earn only a normal profit on the funds that you use to buy the business. So, if you want to earn an economic profit, you must be in on the ground floor: Buying into a business after it is already earning an economic profit will not work because the higher price of buying-in eliminates the economic profit.

9. a. Figure 12.12 shows the demand, marginal revenue, average total cost, and marginal cost curves for the three industries.

b. Figure 12.13 shows the level of output for each industry structure. The single-price monopoly produces the least. Both the perfectly competitive industry and the monopoly able to perfectly price discriminate produce the same amount, which is more than that produced by the single-price monopolist.

c. The consumer surplus is largest in the perfectly competitive industry; it is smallest (zero) with the perfectly price-discriminating monopoly.

d. The total economic profit is largest for the monopoly able to perfectly price discriminate because this monopoly converts all the potential consumer surplus to economic profit. It is smallest for the perfectly competitive industry because in the long run firms in this industry cannot earn economic profits.

e. Both the perfectly competitive industry and the perfectly price-discriminating monopoly produce the efficient amount.

10. Rent seeking refers to the attempt to create a monopoly. People rent seek because, if they can create a monopoly, they stand to earn an economic profit for an indefinite period of time. Rent seeking occurs in a monopoly industry precisely because monopolies can earn economic profits. It does not occur in perfectly competitive industries because firms in these industries cannot earn a long-lasting economic profit. Hence the incentive to rent seek is much less in a perfectly competitive industry.

You’re the Teacher

1. “A couple of mechanical rules might be helpful when we’re studying how a monopoly selects its output and determines its price. First, decide how much the firm produces. Second, determine the price charged.

“To find the profit-maximizing quantity, use the MR and MC curves. The equilibrium quantity is where these curves cross: Draw a vertical line down to the horizontal axis and read the quantity. Then, to find the profit-maximizing price, continue this vertical line up to the demand curve. From the intersection of the demand curve and your vertical quantity line, draw a horizontal line over to the price axis. Where this line meets the price axis is the profit-maximizing price. Use these rules and you’ll be okay.”
2. “Look, the whole idea of price discrimination is that a monopoly wants to charge you a price for the good that more closely reflects how much you value it. If you value it a lot, the monopoly wants to stick you with a really high price; if you don’t value it too much, the monopoly will let you buy it for a lower price. Now, the idea behind consumer surplus is that it measures the difference between how much you value a good and how much you have to pay for it. By price discriminating, the monopoly can reduce this difference: Customers who value it a lot, pay a lot, and customers who don’t value it as much don’t pay as much. So, a price-discriminating monopoly moves the price closer to how much the good is valued, and so the monopoly reduces consumer surplus.”
Chapter Quiz

1. Which of the following is a feature of a monopoly?
   a. Monopoly has no barriers to entry.
   b. Monopolies produce a product with a very close substitute.
   c. A monopoly is the only supplier of the product.
   d. A monopoly faces a perfectly elastic demand for its product.

2. A patent is a ____ barrier to entry and a public franchise is a ____ barrier to entry.
   a. natural; natural
   b. natural; legal
   c. legal; natural
   d. legal; legal

3. In a monopoly, the marginal revenue curve lies
   a. above the demand curve.
   b. on top of the demand curve.
   c. below the demand curve.
   d. sometimes above, sometimes on top of, and sometimes below the demand curve depending on the marginal cost curve.

4. The more perfectly a monopoly can price discriminate, the ____ its output and the ____ its profit.
   a. higher; higher
   b. higher; lower
   c. lower; higher
   d. lower; lower

5. A price discriminating monopoly charges higher prices to customers with
   a. lower quantities demanded.
   b. higher quantities demanded.
   c. higher average willingness to pay.
   d. lower average willingness to pay.

6. Which of the following occurs with both a perfectly competitive industry and a perfectly price discriminating monopoly?
   a. The amount of output is inefficient.
   b. The amount of output is efficient.
   c. Deadweight loss is created.
   d. All consumer surplus is lost to the firm(s).

7. A single-price monopolist will shut down if price is
   a. less than average fixed cost.
   b. less than the minimum average variable cost.
   c. greater than the minimum average total cost.
   d. greater than minimum average variable cost but less than minimum average total cost.

8. The reason that a perfectly competitive industry is more efficient than a single-price monopoly is because the perfectly competitive industry
   a. has higher total costs.
   b. produces more output.
   c. has a market demand that is more elastic.
   d. None of the above.

9. Compared to a perfectly competitive industry, a monopoly transfers
   a. deadweight loss to consumers.
   b. deadweight loss to producers.
   c. producer surplus to consumers.
   d. consumer surplus to the producer.

10. Economies of scope arise when
    a. an increase in output leads to a fall in average total cost.
    b. an increase in the range of goods produced causes average total cost to fall.
    c. doubling the monopoly firm’s inputs more than doubles its output.
    d. high profit allows the company to undertake more research and development.

The answers for this Chapter Quiz are on page 368