**Answers to the Review Quizzes****Page III**

1. Why do we need methods of allocating scarce resources?
Because resources are scarce, it is not possible to fulfill everyone's wants. As a result, some method of deciding which wants will be fulfilled and which will not—that is, some method of allocating resources—must be utilized.
2. Describe the alternative methods of allocating scarce resources.
Resources can be allocated using:
 - Market price: People who are willing and able to pay the price get the resource.
 - Command: Someone in command decides who gets the resource.
 - Majority rule: The majority vote decides how resources are allocated.
 - Contest: Winners receive the resource.
 - First-come, first-served: People first in line get the resource.
 - Lottery: Randomly selected winners receive the resource.
 - Personal characteristics: People with the “right” characteristics get the resource.
 - Force: The stronger person or group gets the resource.
3. Provide an example of each allocation method that illustrates when it works well.
Below are examples of when each allocation scheme works well:
 - Market price: Generally works well in competitive markets and for most goods and services. An example is the allocation of cat food.
 - Command: Generally works well in organizations where lines of authority are clear and it is easy to monitor subordinates. An example is in a fast food restaurant when the supervisor tells a worker to clean the tables.
 - Majority rule: Generally works well when large numbers of people are affected by the allocation. An example is an election in which people vote whether or not to support a tax to build more parks.
 - Contest: Generally works well when the efforts of the participants are hard to monitor. An example is the contest run by Pfizer in which three top managers competed to see who would be appointed CEO.
 - First-come, first-served: Generally works well when a resource can be used by only one user at a time. An example is a line at a movie ticket booth.
 - Lottery: Generally works well when there is no way to easily distinguish which user of a resource would use it most effectively. An example is the lottery used to allocate cell phone frequencies.
 - Personal characteristics: Generally works well when resource use is such that different people consume the same resources. An example is the decision whom to marry.
 - Force: Generally works well when used to uphold the rule of law. An example is the state imprisoning thieves and thereby preventing resource allocation by the thief stealing the resource.

4. Provide an example of each allocation method that illustrates when it works badly.

Below are examples of when each allocation scheme would work poorly:

- Market price: Deciding court cases on the basis of who will pay the most for the decision.
- Command: Running an economy.
- Majority rule: Deciding how many acres of wheat to plant.
- Contest: Allocating food in a winner-take-all contest.
- First-come, first-served: Admitting students to college based on who applied first.
- Lottery: Assigning grades based on random chance.
- Personal characteristics: Renting only to married couples.
- Force: Stealing by threat of physical harm.

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1. What is the relationship between the marginal benefit, value, and demand?

The value of one more unit of a good is its marginal benefit. The marginal benefit of a good or service is measured by the maximum amount that consumers are willing to pay for one more unit of a good or service. The demand curve shows the maximum consumers are willing to pay for each additional unit, so the demand curve is the same as the marginal benefit curve.

2. What is the relationship between individual demand and market demand?

The market demand equals the sum of the individual quantities demanded by all the demanders at each price. Therefore the market demand curve equals the horizontal sum of the individual demand curves.

3. What is consumer surplus? How is it measured?

Consumer surplus is the excess of the benefit received from a good over the amount paid for it. The total consumer surplus is the sum of the consumer surpluses on all the units purchased. It is measured as the area under the demand curve and above the price.

4. What is the relationship between the marginal cost, minimum supply-price, and supply?

The marginal cost is the cost of producing an additional unit of a good. The marginal cost is the minimum price that producers must receive to induce them to offer one more unit of a good or service for sale. This minimum supply-price determines the supply of the good, so the supply curve is the same as the marginal cost curve.

5. What is the relationship between individual supply and market supply?

The market supply equals the sum of the individual quantities supplied by all the producers at each price. The market supply curve is equal to the horizontal sum of all the individual supply curves.

6. What is producer surplus? How is it measured?

Producer surplus is the excess of the amount received from the sale of a good or service over the cost of producing it. The producer surplus is measured as the area under the price and above the supply curve over the entire quantity sold.

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1. Do competitive markets use resources efficiently? Explain why or why not.

In the absence of the obstacles mentioned earlier in the chapter, competitive markets use society's resources efficiently. For resources to be used efficiently they must be allocated to produce the quantity of a good or service where the marginal cost of the last unit produced in the market is equal to the marginal benefit. This condition will be met in a competitive market

because the quantity occurs where the demand curve (which equals the marginal social benefit curve) intersects the supply curve (which equals the marginal social cost curve).

2. What is deadweight loss and under what conditions does it occur?
The deadweight loss is the decrease in total surplus that results from an inefficient level of production. This is the decrease in consumer surplus plus the decrease in producer surplus that occurs when the market either overproduces or underproduces relative to the efficient quantity.
3. What are the obstacles to achieving an efficient allocation of resources in the market economy?
Markets with price or quantity regulations, taxes or subsidies, externalities, public goods or common resources, monopoly power, or high transactions costs will not produce the efficient quantity of a good or service. In each of these situations, the market prices charged or quantities produced and sold will not result in the efficient allocation of resources. Efficiency requires that the marginal social benefit of the last unit produced be equal to the marginal social cost. The equilibrium at the intersection of the demand and supply curves in the competitive market creates this result. When the market price or quantity is pulled away from the market equilibrium, the marginal social benefit of the last unit produced does not equal its marginal social cost.

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1. What are the two big approaches to thinking about fairness?
The two big approaches to thinking about fairness are:
 - “It’s not fair if the *result* isn’t fair,” or *utilitarianism*.
 - “It’s not fair if the *rules* aren’t fair,” or *equality of opportunity*.
2. What is the utilitarian idea of fairness and what is wrong with it?
The utilitarian idea of fairness implies that *equality of incomes* is necessary for the allocation of resources to be “fair.” There should be income transfers from the rich to the poor until equality is achieved, because the marginal benefit of the last dollar of income is the same for everybody. There are two problem with utilitarianism:
 - It ignores the cost of implementing the income transfers, which will decrease the total goods and services that the finite resources of society can produce. The size of the economic pie will be smaller.
 - It ignores the Big Tradeoff, the tradeoff between efficiency and fairness. Taxing people’s incomes makes them work less, which decreases the size of the economic pie and thereby diminishes the total amount that can be transferred to the poor.
3. Explain the big tradeoff. What idea of fairness has been developed to deal with it?
The big tradeoff is the tradeoff between *efficiency* and *fairness*. Redistributing incomes changes the incentives facing producers and consumers. Taxing income decreases producer surplus and taxing purchases decreases consumer surplus. Producers produce less and consumers consume less, and total economic activity declines, such that the size of the economic pie decreases. The big tradeoff has led to the idea that the fairest distribution is that which makes the poorest person as well off as possible.
4. What is the idea of fairness based on fair rules?
The fair rules idea of fairness is that of providing *equality of opportunity* is necessary for the allocation of resources to be “fair.” This is the economic application of the *symmetry principle*,

that people in similar situations be treated similarly. Equality of opportunity can be achieved if two rules are obeyed:

- The government must enforce laws that establish and protect rights to private property that are held by individuals in society, and
- Private property may be transferred from one person to another only by voluntary exchange and without fraudulent representation.

Answers to the Study Plan Problems and Applications

At Chez Panisse, a restaurant in Berkeley, reservations are essential. At Aladdin’s Cave, a restaurant near the University of California San Diego, reservations are recommended. At Eli Cannon’s, a restaurant in Middletown, Connecticut, reservations are not accepted.

Describe the method of allocating scarce table resources at these three restaurants. Why do you think restaurants don’t use the market price to allocate their tables?

All these restaurants use a first-come, first-serve system. Eli Cannon’s uses this system directly. Chez Panisse uses a first-come, first-serve system because the first person to call to make a reservation at a particular time is allocated the table at that time. Aladdin’s cave uses a combination of the immediate first-come, first-serve system and the reservation based first-come, first-serve system.

Market allocation requires that customers pay for a table and the price would fluctuate from one hour to the next depending on the number of customers who arrive. Customers would be highly uncertain about the price they would need to pay and such uncertainty decreases the demand for meals from the restaurant. The decreased demand lowers the restaurant’s profit.

Use the following table to work Problems 2 to 4.

The table gives schedules for the only market, Ann, 2. a. the The the	Price (dollars per mile)	Quantity demanded (miles)			the demand train travel for buyers in the Beth, and Cy. Construct market demand schedule. market demand schedule shows sum of the quantities
		Ann	Beth	Cy	
	3	30	25	20	
	4	25	20	15	
	5	20	15	10	
	6	15	10	5	
	7	10	5	0	
	8	5	0	0	
	9	0	0	0	

demand by Ann, Beth, and Cy at each price. When the price is \$3 per mile, the market quantity demanded is 75 miles; when the price is \$4 per mile, the market quantity demanded is 60 miles; when the price is \$5 per mile, the market quantity demanded is 45 miles; when the price is \$6 per mile, the market quantity demanded is 30 miles; when the price is \$7 per mile, the market quantity demanded is 15 miles; when the price is \$8 per mile, the market quantity demanded is 5 miles; and when the price is \$9 per mile, the market quantity demanded is 0 miles.

- b. What is the maximum price that each traveler, Ann, Beth, and Cy, is willing to pay to travel 20 miles? Why?

Each person’s demand schedule shows the maximum price that person is willing to pay to travel 20 miles. The maximum price Ann is willing to pay to travel 20 miles is \$5 per mile, the maximum price Beth is willing to pay is \$4 per mile, and the maximum price Cy is willing to pay is \$3 per mile.

- 3. a. What is the marginal social benefit when the total distance travelled is 60 miles?

The marginal social benefit when the quantity is 60 miles is \$4 per mile. The marginal social benefit is determined from the consumers’ demand schedules and equals the maximum price that consumers will pay for the quantity. The demand schedule shows that the maximum price consumers will pay for 60 miles is \$4 per mile and this price equals the marginal social benefit.

- b. When the total distance traveled is 60 miles, how many miles does each travel and what

is their marginal private benefit?

The three travel a total distance of 60 miles when the price is \$4 a mile. Each person's marginal benefit is \$4 per mile. At this price Ann travels 25 miles, Beth travels 20 miles, and Cy travels 15 miles.

4. a. What is each traveler's consumer surplus when the price is \$4 a mile? What is the market consumer surplus when the price is \$4 a mile?

Ann's consumer surplus is \$62.50; Beth's consumer surplus is \$40.00; and, Cy's consumer surplus is \$22.50.

When the price is \$4 per mile, Ann buys 25 miles. Ann's consumer surplus is the triangular area under her demand curve and above the price. The demand curve is linear, so Ann's consumer surplus is $1/2 \times (\$9 - \$4) \times 25$, which equals \$62.50.

When the price is \$4 per mile, Beth buys 20 miles. Beth's consumer surplus is the triangular area under her demand curve and above the price. The demand curve is linear, so Beth's consumer surplus is $1/2 \times (\$8 - \$4) \times 20$, which equals \$40.00.

When the price is \$4 per mile, Cy buys 15 miles. Cy's consumer surplus is the triangular area under his demand curve and above the price. The demand curve is linear, so Cy's consumer surplus is $1/2 \times (\$7 - \$4) \times 15$, which equals \$22.50.

The market consumer surplus is the sum of Ann's consumer surplus, Beth's consumer surplus, and Cy's consumer surplus, or \$125.00.

Use the following table to work Problems 5 to 7.

The table gives the supply schedules of hot air balloon rides for the only sellers in the market, Xavier, Yasmin, and Zack.

5. a. Construct the market supply schedule.

The market supply schedule shows the sum of the quantities supplied by Xavier, Yasmin, and Zack at each price. When the price is \$100 per ride, the

Price (dollars per ride)	Quantity supplied (rides per week)		
	Xavier	Yasmin	Zack
100	30	25	20
90	25	20	15
80	20	15	10
70	15	10	5
60	10	5	0
50	5	0	0
40	0	0	0

market quantity supplied is 75 rides; when the price is \$90 per ride, the market quantity supplied is 60 rides; when the price is \$80 per ride, the market quantity supplied is 45 rides; when the price is \$70 per ride, the market quantity supplied is 30 rides; when the price is \$60 per ride, the market quantity supplied is 15 rides; when the price is \$50 per ride, the market quantity supplied is 5 rides; and when the price is \$40 per ride, the market quantity supplied is 0 rides.

- b. What are the minimum prices that Xavier, Yasmin, and Zack are willing to accept to supply 20 rides? Why?

The minimum supply-price equals the lowest price at which a producer is willing to produce the given quantity. The supply schedule tells us the minimum supply-price. Xavier's minimum supply-price for 20 rides is \$80; Yasmin's minimum supply-price is \$90; and, Zack's minimum supply-price is \$100.

6. a. What is the marginal social cost when the total number of rides is 30?
 The quantity of rides supplied is 30 when the price is \$70 per ride. The marginal social cost of any quantity is equal to the price for which that quantity will be supplied, so when the total number of rides is 30, the marginal social cost equals \$70 per ride.
- b. What is the marginal cost for each supplier when the total number of rides is 30 and how many rides does each of the firms supply?
 When the total number of rides is 30, Xavier supplies 15 rides, Yasmin supplies 10 rides, and Zack supplies 5 rides. The marginal cost for each firm is \$70.
7. When the price is \$70 a ride, what is each firm's producer surplus? What is the market producer surplus?
 Xavier's producer surplus is \$225; Yasmin's is \$100; and, Zack's is \$25.
 When the price is \$70 per ride, Xavier supplies 15 rides. Xavier's producer surplus is the triangular area under the price and above his supply curve. The supply curve is linear, so Xavier's producer surplus is $1/2 \times (\$70 - \$40) \times 15$, which equals \$225.
 When the price is \$70 per ride, Yasmin supplies 10 rides. Yasmin's producer surplus is the triangular area under the price and above his supply curve. The supply curve is linear, so Yasmin's producer surplus is $1/2 \times (\$70 - \$50) \times 10$, which equals \$100.
 When the price is \$70 per ride, Zack supplies 5 rides. Zack's producer surplus is the triangular area under the price and above his supply curve. The supply curve is linear, so Zack's producer surplus is $1/2 \times (\$70 - \$60) \times 5$, which equals \$25.
 The market producer surplus is equal to the sum of Xavier's producer surplus, Yasmin's producer surplus, and Zack's producer surplus, which is $\$225 + \$100 + \$25$ or \$350.

8. The figure shows the competitive market for smartphones.

- a. What is the market equilibrium?
 The equilibrium price is \$30 per smartphone and the equilibrium quantity is 100 smartphones per month.
- b. Shade in the consumer surplus and label it.
 In Figure 5.2 the consumer surplus is the shaded area A.
- c. Shade in the producer surplus and label it.
 In Figure 5.2 the producer surplus is the shaded area B.
- d. Calculate total surplus.
 The total surplus is equal to the sum of the consumer surplus plus the producer surplus, or the triangle with area A + area B. The amount of the total surplus equals $1/2 \times (\$60$
 per smartphone – \$15 per smartphone) \times
 100 smartphones, which is \$2,250.
- e. Is the competitive market for smartphones efficient?
 The equilibrium quantity of smartphones is 100 smartphones per month because this is the quantity at which the demand and supply

FIGURE 5.1
Problem 8

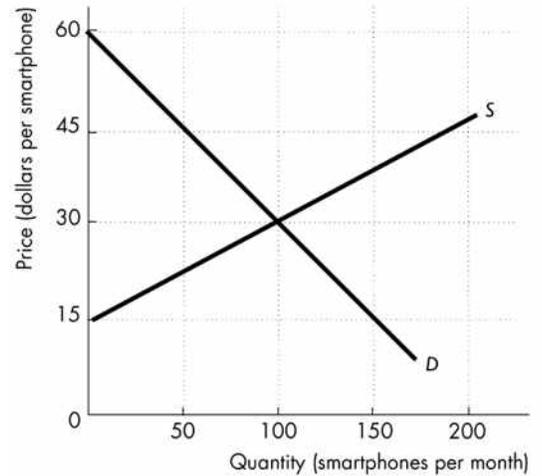
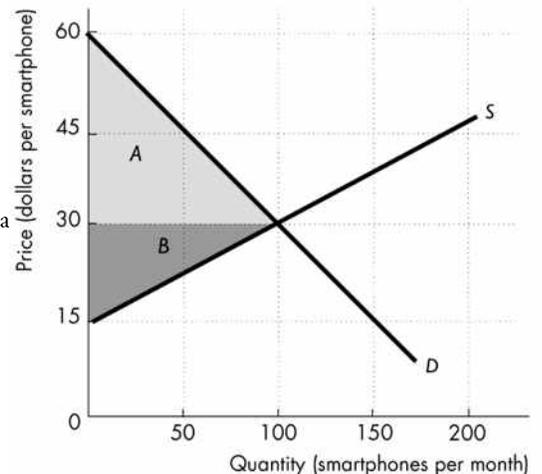


FIGURE 5.2
Problem 8



curves intersect. The demand curve is the marginal social benefit curve and the supply curve is the marginal social cost curve. Therefore the efficient quantity of smartphones is 100 cell phones per month because this is the quantity at which these two curves intersect. This competitive market is efficient because the equilibrium quantity equals the efficient quantity.

9. Explain why the allocation method used by each restaurant in Problem 1 is fair or not fair.

According to the “fair rules” approach, all of the methods are fair because everyone faces the same rules and therefore the same chance of obtaining a table. According to the “fair results” approach, none of the methods are fair because in each case some people get a table and others do not.

10. In the Worked Problem (p. 126), how can the 50 bottles available be allocated to beachgoers? Would the possible methods be fair or unfair?

The 50 bottles could be allocated by market price (the price would be \$15, the price that allocates the 50 bottles among the buyers), by command (someone, perhaps the beach patrol, declares who gets the bottles), by majority rule (beachgoers vote to determine who gets the bottles), by a contest (the winners of a beach volleyball game receive the bottles), by first-come, first-served, by a lottery, by personal characteristics (perhaps light-skinned people get the bottles), and by force. None of the methods are fair by the “results” view of fairness unless the personal characteristics method use income, with poorer people getting the bottles. The market exchange method is the only fair method under the “rules” view of fairness.

Answers to Additional Problems and Applications

11. At McDonald's, no reservations are accepted; at Panorama at the St. Louis Art Museum, reservations are accepted; at the Bissell Mansion restaurant, reservations are essential. Describe the method of allocating tables in these three restaurants. Why do restaurants have different reservation policies?

All these restaurants use a first-come, first-serve system. McDonald's uses this system directly. Bissell Mansion uses a first-come, first-serve because the first person to call to make a reservation at a particular time is allocated the table at that time. Puck's uses a combination of the immediate first-come, first-serve system and the reservation based first-come, first-serve system.

The speed with which tables turn over at the different restaurants probably is quite different and the customers probably have quite different values of time. Bissell Mansion has a low turnover rate—only 1 or 2 groups of customers can use a table each night—and its customers have a high value of time. If Bissell Mansion refused to take reservations, its customers would need to wait an inefficiently long time and would go elsewhere so that Bissell Mansion profits would be lower. At McDonald's, the tables have a high turnover rate (indeed, many customers do not use the tables at all, buying their food to go) and the customers have a lower value of time. Allowing reservations would be costly for McDonald's and would spare its customers only a slight wait at most so that allowing reservations would decrease McDonald's profits. At Puck's, the turnover rate of the tables is between that at Bissell Mansion and McDonald's, so it uses a combination of phone reservation first-come, first-serve and appear in person first-come, first-serve.

Use the following table to work Problems 12 to 15.

The table gives the supply schedules for jet-ski rides by the only suppliers: Rick, Sam, and Tom.

12. What is each owner's minimum supply-price of 10 rides a day? Rick's minimum supply-price for 10 rides is \$15.00, Sam's minimum supply-price is \$17.50, and Tom's minimum supply-price is \$20.00.

Price (dollars per ride)	Quantity supplied (rides per week)		
	Rick	Sam	Tom
10.00	0	0	0
12.50	5	0	0
15.00	10	5	0
17.50	15	10	5
20.00	20	15	10

13. Which owner has the largest producer surplus when the price of a ride is \$17.50? Explain. Rick has the largest producer surplus when the price is \$17.50. Rick's producer surplus is largest because he produces the largest quantity and his costs are lower than those of the other producers. More formally, each supplier's producer surplus is equal to the area under the price and above that producer's supply curve. Calculating these areas of producer surplus, Rick's producer surplus is \$56.25, Sam's producer surplus is \$25.00, and Tom's producer surplus is \$6.25.
14. What is the marginal social cost of 45 rides a day? 45 rides are produced when the price is \$20.00, so the marginal social cost of producing 45 rides a day is \$20.00.
15. Construct the market supply schedule of jet-ski rides. When the price is \$10.00, the quantity of rides supplied is 0; when the price is \$12.50, the quantity supplied is 5 rides; when the price is \$15.00, the quantity supplied is 15; when the

price is \$17.50, the quantity supplied is 30; and, when the price is \$20, the quantity supplied is 45.

16. The table gives the demand and supply schedules for sandwiches.

a. What is the maximum price that consumers are willing to pay for the 200th sandwich?

The demand schedule shows the maximum price that consumers will pay for each sandwich. The maximum price consumers will pay for the 200th sandwich is \$2.

b. What is the minimum price that producers are willing to accept for the 200th sandwich?

The supply schedule shows the minimum price that producers will accept for each sandwich. The minimum price that producers are willing to accept for the 200th sandwich is \$4.

c. If 200 sandwiches a day are available, what is the total surplus?

200 sandwiches a day are more than the efficient quantity because the marginal social benefit (the maximum price consumers will pay) is less than the marginal social cost (the minimum price suppliers will accept). Because production is inefficient, there is a deadweight loss, equal to the sum of the consumer surplus and producer surplus lost because the quantity produced is not the efficient quantity. The deadweight loss equals the quantity (200 – 150) multiplied by $(\$4 - \$2)/2$, which is \$50. This deadweight loss must be subtracted from the surplus that would be obtained if the market was efficient to calculate the total surplus when 200 sandwiches are produced. When the market produces the efficient quantity, 150 sandwiches are produced. The total surplus at this efficient quantity equals the area of the triangle under the demand curve and above the supply curve to the quantity of 150. This area is $\frac{1}{2} \times (\$6 - \$0) \times 150$, which is \$450. So the total surplus when 200 sandwiches are produced equals \$450 – \$50, which is \$400.

Price (dollars per sandwich)	Quantity demanded (sandwiches per hour)	Quantity supplied
0	300	0
1	250	50
2	200	100
3	150	150
4	100	200
5	50	250
6	0	300

17. Warm February Gives Minnesotans a Break on Heating Bills

When John Wicks opened his natural gas bill for January he was very happy. It was \$147, not the usual \$300 for the coldest month. Natural gas provider CenterPoint Energy said higher temperatures had lowered the annual bill for the average Minnesota customer by \$300 compared with two years ago.

Source: CBC News, March 1, 2017

a. How is the price of natural gas determined?

The price of natural gas is determined in the market for natural gas by demand and supply.

b. When demand decreases, explain the process by which the market adjusts.

When demand decreases, at the initial equilibrium price there is a surplus. The surplus forces the price to fall. As the price falls, the quantity demanded increases and the quantity supplied decreases. The price continues to fall until the quantity demanded equals the quantity supplied. That price is the new equilibrium price. Once that price is reached, there are no further changes.

FIGURE 5.3a
Problem 17

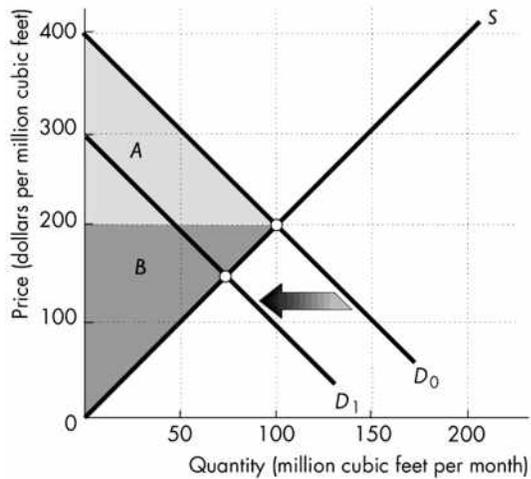
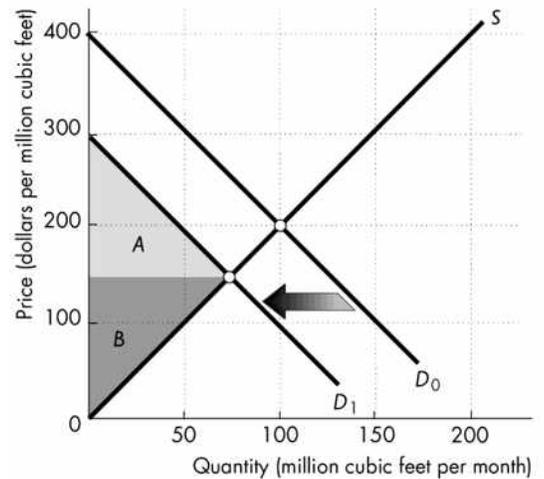


FIGURE 5.3b
Problem 17



- c. On a graph, show the effect of the decrease in demand on consumer surplus and producer surplus.

Figure 5.3a shows the in consumer surplus (labeled *A*) and producer surplus (labeled *B*). After the decrease in demand, Figure 5.3b shows the new consumer surplus (again labeled *A*) and the new producer surplus (again labeled *B*).

18. Use the data in the table in Problem 16.

- a. If the sandwich market is efficient, what is the consumer surplus, what is the producer surplus, and what is the total surplus?

150 sandwiches is the efficient quantity and the equilibrium price is \$3. The consumer surplus is the area of the triangle under the demand curve above the price. The area of the consumer surplus triangle is $\frac{1}{2} \times (\$6 - \$3) \times 150$, which is \$225. The producer surplus is the area of the triangle above the supply curve below the price. The price is \$3 and the quantity is 150. The area of the triangle is $\frac{1}{2} \times (\$3 - \$0) \times 150$, which is \$225. The total surplus is the sum of the consumer surplus plus the producer surplus, which is \$450.

- b. If the demand for sandwiches increases and sandwich makers produce the efficient quantity, what happens to producer surplus and deadweight loss?

If the demand for sandwiches increases, the price and quantity of sandwiches both rise. The producer surplus definitely increases. There is no deadweight loss because sandwich makers are producing the efficient quantity.

Use the following news clip to work Problems 19 to 21.

Music's Value in the Internet Age

The price of streaming services has been \$10 a month or zero. Amazon and Pandora Media are poised to change the streaming scene. Pandora is a streaming Internet radio service, and its new \$5 version will be more like Spotify and Apple Music, which let users create their own playlists. Amazon, which offers limited on-demand music for \$99 a year, is expected to expand its catalog and offer it for \$10 a month or \$5 a month for customers who use the Echo, Amazon's voice-activated speaker system.

Source: *The New York Times*, September 11, 2016

Assume that the marginal social cost of streaming is zero. (This assumption means that the cost of operating a streaming service doesn't change if more people stream more songs.)

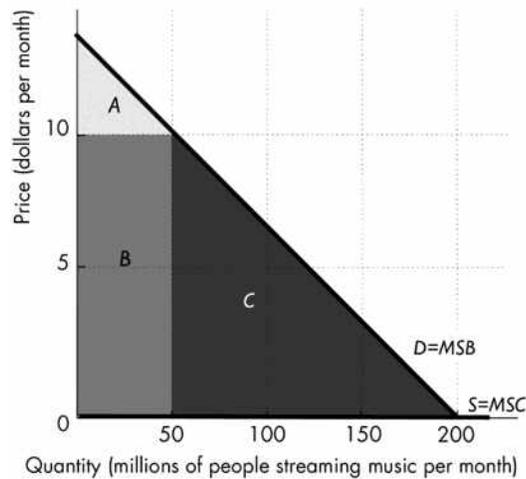
19. a. Draw a graph of the market for streaming music with a price of \$10 a month. On your graph, show consumer surplus and producer surplus.

Figure 5.4 shows this market. The marginal social cost curve runs along the horizontal axis. The consumer surplus is area *A* and the producer surplus is area *B*.

- b. With a price of \$10 a month, is the market efficient or inefficient? If it is inefficient, show the deadweight loss on your graph.

The market is inefficient. Efficiency requires that the amount be the quantity for which the marginal social benefit equals the marginal social cost, which in this case is the quantity at which the marginal social benefit curve intersects the horizontal axis. The deadweight loss is area *C* in Figure 5.4.

FIGURE 5.4
Problem 19



20. If the \$5 price described in the news clip were adopted, how would consumer surplus, producer surplus, and the deadweight loss change?

The consumer surplus increases. If the demand for streaming is inelastic, then the producer surplus decreases; if the demand is elastic, then the producer surplus increases.

Unambiguously the deadweight loss decreases.

21. a. If the \$5 price described in the news clip were adopted, would the market be efficient or inefficient? Explain.

The market remains inefficient because the marginal social benefit still does not equal the marginal social cost. The inefficiency is less if the price is \$5 per month than \$10 because, as the answer to question 20 noted, the deadweight loss is less, but the market is still inefficient.

- b. Is the \$5 price described in the news clip a competitive market price? Explain.

With a pure competitive market price, the price is determined by supply and demand and would be \$0. The \$5 price is not a competitive market price.

22. Only 1 percent of the world supply of water is fit for human consumption. Some places have more water than they can use; some could use much more than they have. The 1

percent available would be sufficient if only it were in the right place.

- a. What is the major problem in achieving an efficient use of the world's water?
Water needs to be transported from where it is available to where it is needed. This basic issue leads to two major problems: Overproduction in some areas and underproduction in other areas. Often overproduction in an area leads to underproduction later in the same area. In particular, markets in water are not competitive. In many areas, water is "free" to whoever digs a deep enough well. As a result, too many people dig wells and water is overproduced. If the overproduction is bad enough, the level of groundwater can be reduced so far that it becomes literally impossible to extract any water. Then water needs to be transported to the now arid area. In this case, often the government transports the water and sells it at a very low price or gives it away. But because the government does not sell the water at an equilibrium price (and because the government is not motivated by seeking profit) less water is transported than the efficient quantity.
 - b. If there were a global market in water, like there is in oil, how do you think the market would be organized?
The market for water would be more efficient than the current situation. Areas with a great deal of water, say Canada, could export water to areas with less water, say Mexico. If water was purchased and sold in markets, there would be greater incentive to build desalination plants where they are practical as well as greater incentive to conserve water where it is in abundance.
 - c. Would a free world market in water achieve an efficient use of the world's water resources? Explain why or why not.
A free world market in water likely would (eventually) bring an efficient use of resources as the necessary infrastructure was constructed. Of the factors that can lead to inefficiency (government price and quantity regulations, monopoly power, and so forth) the only issue that could possibly lead to inefficiency is the point that water is a common resource in some situations.
23. Use the information in Problem 22. Would a free world market in water achieve a fair use of the world's water resources? Explain why or why not and be clear about the concept of fairness that you are using.
A "fair results" approach to fairness would argue that in third world countries, very poor inhabitants (for example, nomads) would not be able to afford "enough" water and so some redistribution is needed for the sake of fairness. A "fair rules" approach to fairness asserts that a competitive market is enough to insure fairness because the exchange of water is voluntary.
 24. The winner of the men's and women's tennis singles at the U.S. Open is paid twice as much as the runner-up, but it takes two players to have a singles final. Is the compensation arrangement fair?
The compensation arrangement is efficient because all the participants play their hardest in an attempt to win the prize. As a result, the quality of play is extremely high and the "amount" of tennis produced is large. But the efficient outcome is not necessarily a fair outcome. The fair results approach to fairness asserts that the compensation scheme is unfair because income is not equally distributed. The fair rules approach asserts that the scheme is fair because the players voluntarily enter the tournament and the symmetry principle is not violated.

25. Thousands of Gouging Complaints after Hurricane Matthew

After Hurricane Matthew, more than 2,000 Florida consumers complained of price gouging to the State Attorney General. Two examples: a hotel room normally \$65 a night cost \$150, and a \$1 bottle of water was \$5. In a declared state of emergency, “unconscionable prices” are prohibited.

Source: news-press.com, October 7, 2016

- a. Are the two examples in the news clip examples of price gouging or of competitive markets doing their job of allocating scarce resources? Explain.
Both examples reflect how an increase in demand results in a higher price. From this perspective, both examples demonstrate competitive markets allocating scarce resources.
- b. Are the two examples of price increases in the news clip fair?
According to the fair rules approach, the higher prices are fair. According to the fair results approach, the higher prices are probably not fair unless the higher prices allocated the rooms and water to the poor, which seems unlikely.
- c. Is it fair to prohibit “unconscionable prices”?
According to the fair rules approach, it is not fair to prohibit “unconscionable prices” because that prohibition prevents voluntary exchange. Under the fair results approach, if the prohibition means that poorer people receive the rooms and water, the prohibition is fair. But it is unlikely that prohibiting high prices will mean that the rooms and water go exclusively (or even generally) to people with lower than average incomes.

Economics in the News

33. After you have studied *Economics in the News* on pp. 120–121, answer the following questions.

- a. What is the method used to allocate highway space in Los Angeles and what is the method used in Singapore?
Highway space in Los Angeles is allocated using first-come, first-serve. Highway space in Singapore is allocated using market price.
- b. Who benefits from the LA method of highway resource allocation? Explain your answer using the ideas of marginal social benefit, marginal social cost, consumer surplus, and producer surplus.
In Los Angeles, roads are allocated using first-come, first-served. This allocation is inefficient and so deadweight loss is created. Drivers with a low valuation of time (that is, a low marginal benefit) gain consumer surplus and thereby benefit because they are willing to drive even though they create congestion. Some gas stations, oil refiners, and other producers of highway-related goods and services gain producer surplus because of the extra gallons of gasoline wasted because of the congestion.
- c. Who benefits from the Singaporean method of highway resource allocation? Explain your answer using the ideas of marginal social benefit, marginal social cost, consumer surplus, and producer surplus.
In Singapore, roads are allocated using market price. Drivers who have marginal benefit that exceeds the price will drive and will gain consumer surplus. Producers of highway services will gain producer surplus. Because market price is used, the allocation is efficient so the sum of consumer surplus and producer surplus is maximized.

- d. If road use were rationed by limiting drivers with even-date birthdays to drive only on even days (and odd-date birthdays to drive only on odd days), would highway use be more efficient? Explain your answer.

Allocation by personal characteristic, such as birthdays, does not make the use of highways more efficient. Efficiency requires that drivers with the highest marginal benefits from highway use are those who use the highways. Allocation by birthdays means that some drivers with high marginal benefits are forbidden from driving on the freeway on days that do not align with their birthday.

34. Water Rate Hikes Have Farmers Steaming

Most residents of Ventura County, California, pay \$3.10 per 100 cubic feet of water. Agricultural water users pay \$1.79 per 100 cubic feet. Water officials propose to increase these prices to \$4.24 for residential users and to \$4.92 for agricultural users by 2020. Water district officials say these price increases are fair.

Source: *Moorpark Acorn*, January 13, 2017

- a. Do you think that the allocation of water between agricultural and residential users is likely to be efficient? Explain your answer.
- The allocation of water is almost surely inefficient. If the marginal social cost of distributing water is the same for agricultural and residential users, as is probably the case, the only way that the allocation scheme can be efficient is if the marginal social benefit from water for agricultural is less than that of residential users. Such a situation seems unlikely because water is necessary for agricultural users to grow their crops so the marginal social benefit of water to farmers probably exceeds that for residential users.
- b. If agricultural users paid a higher price, would the allocation of resources be more efficient?
- If agricultural users paid a higher rate for water, probably the allocation of resources would be more efficient. Efficiency requires that marginal social benefit equals marginal social cost. Currently it is likely the case that the marginal social benefit of the last unit of water for agricultural users is less than the marginal social cost of producing the last unit of water.
- c. If agricultural users paid a higher price, what would happen to consumer surplus and producer surplus from water?
- If the price paid by agricultural users rises, the consumer surplus of agricultural users decreases and the producer surplus increases.
- d. Is the proposed change in prices paid by agricultural and residential users fair?
- The price is proposed to rise by \$1.14 for residential users so that they wind up paying \$4.24 per 100 cubic feet of water and by \$3.13 for agricultural users so they end up paying more, \$4.92. According to the “fair results” approach, the difference in price is fair if agricultural users are wealthier than residential users. If, however, agricultural users are poorer than or comparable to residential users, the difference in price is not fair. The difference in price is not fair according to the “fair rules” approach because the price of water is not determined in competitive markets.

