Chapter 1 Exercises

Self-Check Questions

1. What is scarcity? Can you think of two causes of scarcity?

2. Residents of the town of Smithfield like to consume hams, but each ham requires 10 people to produce it and takes a month. If the town has a total of 100 people, what is the maximum amount of ham the residents can consume in a month?

3. A consultant works for $200 per hour. She likes to eat vegetables but is not very good at growing them. Why does it make more economic sense for her to spend her time at the consulting job and shop for her vegetables?

4. A computer systems engineer could paint his house, but it makes more sense for him to hire a painter to do it. Explain why.

5. What would be another example of a system in the real world that could serve as a metaphor for micro and macroeconomics?

6. Suppose we extend the circular flow model to add imports and exports. Copy the circular flow diagram onto a sheet of paper and then add a foreign country as a third agent. Draw the flows of imports, exports, and the payments for each on your diagram.

7. What is an example of a problem in the world today, not mentioned in the chapter, that has an economic dimension?

8. The chapter defines private enterprise as a characteristic of market-oriented economies. What would public enterprise be? (*Hint*: it is a characteristic of command economies.)

9. Why might Belgium, France, Italy, and Sweden have a higher export-to-GDP ratio than the United States?

Review Questions

10. Give the three reasons that explain why the division of labor increases an economy's level of production.

11. What are three reasons to study economics?

12. What is the difference between microeconomics and macroeconomics?

13. What are examples of individual economic agents?

14. What are the three main goals of macroeconomics?

15. How did John Maynard Keynes define economics?

16. Are households primarily buyers or sellers in the goods and services market? In the labor market?

17. Are firms primarily buyers or sellers in the goods and services market? In the labor market?

18. What are the three ways that societies can organize themselves economically?

19. What is globalization? How do you think it might have affected the economy over the past decade?

Critical Thinking Questions

20. Suppose you have a team of two workers: one is a baker and one is a chef. Explain why the kitchen can produce more meals in a given period of time if each worker specializes in what they do best than if each worker tries to do everything from appetizer to dessert.

21. Why would division of labor without trade not work?

22. Can you think of any examples of free goods, that is, goods or services that are not scarce?

23. A balanced federal budget and a balance of trade are considered secondary goals of macroeconomics, while growth in the standard of living (for example) is considered a primary goal. Why do you think that is so?

24. Macroeconomics is an aggregate of what happens at the microeconomic level. Would it be possible for what happens at the macro level to differ from how economic agents would react to some stimulus at the micro level? (*Hint*: think about the behavior of crowds.)

25. Why is it unfair or meaningless to criticize a theory as unrealistic?

26. Suppose, as an economist, you are asked to analyze an issue unlike anything you have ever done before. Also, suppose you do not have a specific model for analyzing that issue. What should you do?

27. Why do you think that most modern countries' economies are a mix of command and market types?

28. Can you think of ways that globalization has helped you economically? Can you think of ways that it has not?

Chapter 2 Exercises

Self-Check Questions

1. Suppose Alphonso's town raised the price of bus tickets to \$2 per trip (while the price of burgers stayed at \$4 and his budget remained \$20 per week). Draw Alphonso's new budget constraint. What happens to the opportunity cost of bus tickets?

2. Suppose there is an improvement in medical technology that enables more health care to be provided with the same amount of resources. How would this affect the production possibilities curve, and in particular, how would it affect the opportunity cost of education?

3. Could a nation be producing in a way that is allocatively efficient but not productively inefficient?

4. What are the similarities between a consumer's budget constraint and society's production possibilities frontier, not just graphically but analytically?

5. Individuals may not act in the rational, calculating way described by the economic model of decision-making, measuring utility and costs at the margin, but can you make a case that they behave approximately in that way?

6. Would an op-ed piece in a newspaper urging the adoption of a particular economic policy be considered a positive or normative statement?

7. Would a research study on the effects of soft drink consumption on children's cognitive development be considered a positive or normative statement?

Review Questions

8. Explain why scarcity leads to tradeoffs.

9. Explain why individuals make choices that are directly on the budget constraint rather than inside the budget constraint or outside it.

10. What is comparative advantage?

11. What does a production possibilities frontier illustrate?

12. Why is a production possibilities frontier typically drawn as a curve rather than a straight line?

13. Explain why societies cannot make a choice above their production possibilities frontier and should not make a choice below it.

14. What are diminishing marginal returns?

15. What is productive efficiency? Allocative efficiency?

16. What is the difference between a positive and a normative statement?

17. Is the economic model of decision-making intended as a literal description of how individuals, firms, and the governments actually make decisions?

18. What are four responses to the claim that people should not behave in the way described in this chapter?

Critical Thinking Questions

19. Suppose Alphonso's town raises the price of bus tickets from $1 to $2, and the price of burgers rises from $4 to $8. Why is the opportunity cost of bus tickets unchanged? Suppose Alphonso's weekly spending money increases from $20 to $40. How is his budget constraint affected from all three changes? Explain.

20. During the Second World War, Germany's factories were decimated, and the country suffered many human casualties, both soldiers and civilians. How did the war affect Germany's production possibilities curve?

21. It is clear that productive inefficiency is a waste since resources are being used in a way that produces fewer goods and services than a nation is capable of. Why is allocative inefficiency also wasteful?

22. What assumptions about the economy must be true for the invisible hand to work? To what extent are those assumptions valid in the real world?

23. Do economists have any particular expertise in making normative arguments? In other words, they have expertise in making positive statements (i.e., what will happen) about some economic policy, for example, but do they have special expertise to judge whether or not the policy *should* be undertaken?

Problems

Use this information to answer the following four questions: Marie has a weekly budget of $24, which she likes to spend on magazines and pies.

24. If the price of a magazine is $4 each, what is the maximum number of magazines she could buy in a week?

25. If the price of a pie is $12, what is the maximum number of pies she could buy in a week?

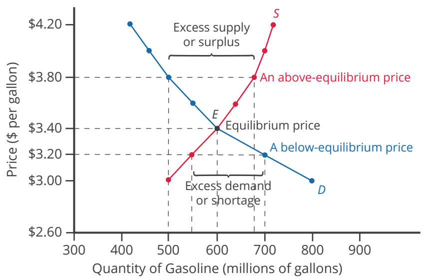
26. Draw Marie's budget constraint with pies on the horizontal axis and magazines on the vertical axis. What is the slope of the budget constraint?

27. What is Marie's opportunity cost of purchasing a pie?

Chapter 3 Exercises

Self-Check Questions

1. Review the following figure. Suppose the price of gasoline is $3.60 per gallon. Is the quantity demanded higher or lower than at the equilibrium price of $3.40 per gallon? What about the quantity supplied? Is there a shortage or a surplus in the market? If so, how much?



2. Why do economists use the *ceteris paribus* assumption?

3. In an analysis of the market for paint, an economist discovers the following listed facts. State whether each of these changes will affect supply or demand, and in what direction.

- **a.** There have recently been some important cost-saving inventions in the technology for making paint.
- **b.** Paint is lasting longer, so property owners need not repaint as often.
- **c.** Because of severe hailstorms, many people need to repaint now.
- **d.** The hailstorms damaged several factories that make paint, forcing them to close down for several months.

4. Many changes are affecting the market for oil. Predict how each of the following events will affect the equilibrium price and quantity in the market for oil. In each case, sketch a supply and demand diagram to support your answer.

- **a.** Cars are becoming more fuel-efficient and therefore get more miles to the gallon.
- **b.** The winter is exceptionally cold.
- **c.** A major discovery of new oil is made off the coast of Norway.
- **d.** The economies of some major oil-using nations, like Japan, slow down.
- **e.** A war in the Middle East disrupts oil-pumping schedules.
- **f.** Landlords install additional insulation in buildings.
- **g.** The price of solar energy falls dramatically.
- **h.** Chemical companies invent a new, popular kind of plastic made from oil.

5. Let's think about the market for air travel. From August 2014 to January to 2015, the price of jet fuel increased roughly 47%. Using the four-step analysis, how do you think this fuel price increase affected the equilibrium price and quantity of air travel?

6. A tariff is a tax on imported goods. Suppose the U.S. government cuts the tariff on imported flat-screen televisions. Using the four-step analysis, how do you think the tariff reduction will affect the equilibrium price and quantity of flat-screen TVs?

7. What is the effect of a price ceiling on the quantity demanded of the product? What is the effect of a price ceiling on the quantity supplied? Why exactly does a price ceiling cause a shortage?

8. Does a price ceiling change the equilibrium price?

9. What would be the impact of imposing a price floor below the equilibrium price?

10. Does a price ceiling increase or decrease the number of transactions in a market? Why? What about a price floor?

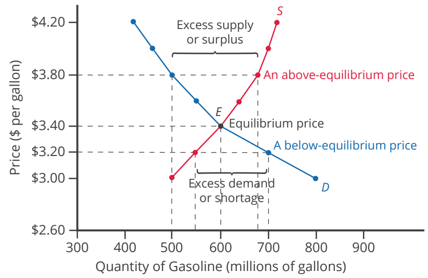
11. If a price floor benefits producers, why does a price floor reduce social surplus?

Review Questions

12. What determines the level of prices in a market?
13. What does a downward-sloping demand curve mean about how buyers in a market will react to a higher price?
14. Will demand curves have the same exact shape in all markets? If not, how will they differ?
15. What does an upward-sloping supply curve mean about how sellers in a market will react to a higher price?
16. Will supply curves have the same shape in all markets? If not, how will they differ?
17. What is the relationship between quantity demanded and quantity supplied at equilibrium? What is the relationship when there is a shortage? What is the relationship when there is a surplus?
18. How can you locate the equilibrium point on a demand and supply graph?
19. If the price is above the equilibrium level, would you predict excess supply or excess demand? If the price is below the equilibrium level, would you predict a shortage or a surplus? Why?
20. When the price is above the equilibrium, explain how market forces move the market price to equilibrium. Do the same when the price is below the equilibrium.
21. What is the difference between the demand and the quantity demanded of a product, say milk? Explain in words and show the difference on a graph with a demand curve for milk.
22. What is the difference between the supply and the quantity supplied of a product, say milk? Explain in words and show the difference on a graph with the supply curve for milk.
23. When analyzing a market, how do economists deal with the problem that many factors that affect the market are changing at the same time?
24. Name some factors that can cause a shift in the demand curve in markets for goods and services.
25. Name some factors that can cause a shift in the supply curve in markets for goods and services.
26. How does one analyze a market where both demand and supply shift?
27. What causes a movement along the demand curve? What causes a movement along the supply curve?
28. Does a price ceiling attempt to make a price higher or lower?
29. How does a price ceiling set below the equilibrium level affect quantity demanded and quantity supplied?
30. Does a price floor attempt to make a price higher or lower?
31. How does a price floor set above the equilibrium level affect quantity demanded and quantity supplied?
32. What is consumer surplus? How is it illustrated on a demand and supply diagram?
33. What is producer surplus? How is it illustrated on a demand and supply diagram?
34. What is total surplus? How is it illustrated on a demand and supply diagram?
35. What is the relationship between total surplus and economic efficiency?
36. What is deadweight loss?

Critical Thinking Questions

37. Review the following figure. Suppose the government decided that, since gasoline is a necessity, its price should be legally capped at $3.30 per gallon. What do you anticipate would be the outcome in the gasoline market?



38. Explain why the following statement is false: "In the goods market, no buyer would be willing to pay more than the equilibrium price."

39. Explain why the following statement is false: "In the goods market, no seller would be willing to sell for less than the equilibrium price."

40. Consider the demand for hamburgers. If the price of a substitute good (e.g., hot dogs) increases and the price of a complement good (e.g., hamburger buns) increases, can you tell for sure what will happen to the demand for hamburgers? Why or why not?

41. How do you suppose the demographics of an aging population of baby boomers in the United States will affect the demand for milk? Justify your answer.

42. We know that a change in the price of a product causes a movement along the demand curve. Suppose consumers believe that prices will be rising in the future. How will that affect demand for the product in the present? Can you show this graphically?

43. Suppose there is soda tax to curb obesity. What should a reduction in the soda tax do to the supply of sodas and to the equilibrium price and quantity? Can you show this graphically? (*Hint:* assume that the soda tax is collected from the sellers.)

44. Use the four-step process to analyze the impact of the advent of the iPad (or other tablet computers) on the equilibrium price and quantity of the MacBook (or other laptop computers).

45. Use the four-step process to analyze the impact of a reduction in tariffs on imports of iPads on the equilibrium price and quantity of MacBook-type products.

46. Suppose both of these events took place at the same time. Combine your analyses of the impacts of the iPad and the tariff reduction to determine the likely impact on the equilibrium price and quantity of MacBook-type products. Show your answer graphically.

47. Most government policy decisions have winners and losers. What are the effects of raising the minimum wage? It is more complex than simply producers lose and workers gain. Who are the winners, who are the losers, and what exactly do they win and lose? To what extent does the policy change achieve its goals?

48. Agricultural price supports result in the government holding large inventories of agricultural products. Why do you think the government can't simply give the products away to poor people?

49. Can you propose a policy that would induce the market to supply more rental housing units?

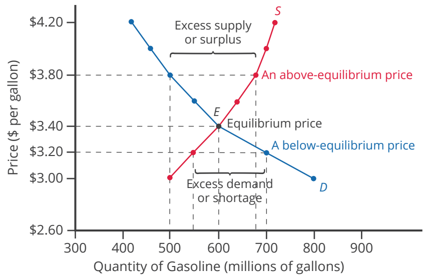
50. What term would an economist use to describe what happens when a shopper gets a "good deal" on a product?

51. Explain why voluntary transactions improve social welfare.

52. Why would a free market never operate at a quantity greater than the equilibrium quantity? (*Hint:* what would be required for a transaction to occur at that quantity?)

Problems

53. Review the following figure. Suppose the price of gasoline is \$3.00. Will the quantity demanded be lower or higher than at the equilibrium price of \$3.40 per gallon? Will the quantity supplied be lower or higher? Is there a shortage or a surplus in the market? If so, of how much?



54. The following table shows information on the demand and supply for bicycles, where the quantities of bicycles are measured in thousands.

Price	Q_d	Q_s
\$120	50	36
\$150	40	40
\$180	32	48
\$210	28	56
\$240	24	70

a. What is the quantity demanded and the quantity supplied at a price of \$210?

b. At what price is the quantity supplied equal to 48,000?

c. Graph the demand and supply curve for bicycles. How can you determine the equilibrium price and quantity from the graph? How can you determine the equilibrium price and quantity from the table? What are the equilibrium price and equilibrium quantity?

d. If the price was \$120, what would the quantities demanded and supplied be? Would a shortage or surplus exist? If so, how large would the shortage or surplus be?

55. The computer market in recent years has seen many more computers sell at much lower prices. What shift in demand or supply is most likely to explain this outcome? Sketch a demand and supply diagram and explain your reasoning.

a. A rise in demand

b. A fall in demand

c. A rise in supply

d. A fall in supply

56. Demand and supply in the market for cheddar cheese is illustrated in the following table.

Price per Pound	Q_d	Q_s
$3.00	750	540
$3.20	700	600
$3.40	650	650
$3.60	620	700
$3.80	600	720
$4.00	590	730

Graph the data and find the equilibrium. Next, create a table showing the change in quantity demanded or quantity supplied, and draw a graph of the new equilibrium, in each of the following situations:

a. The price of milk, a key input for cheese production, rises, so that the supply decreases by 80 pounds at every price.

b. A new study says that eating cheese is good for your health, so demand increases by 20% at every price.

57. Supply and demand for movie tickets in a city are shown in the following table.

Price	Q_d	Q_s
$11.00	26	16
$12.00	24	18
$13.00	22	20
$14.00	21	21
$15.00	20	22

Graph demand and supply and identify the equilibrium. Then, calculate in a table and graph the effect of the following two changes.

a. Three new nightclubs open. They offer decent bands and have no cover charge; they make their money by selling food and drink. As a result, demand for movie tickets falls by 6 units at every price.

b. The city eliminates a tax that it had been placing on all local entertainment businesses. The result is that the quantity supplied of movies at any given price increases by 10%.

58. A low-income country decides to set a price ceiling on bread so they can make sure that bread is affordable to the poor. The conditions of demand and supply are given in the following table. What are the equilibrium price and equilibrium quantity before the price ceiling? What will the excess demand or the shortage (that is, quantity demanded minus quantity supplied) be if the price ceiling is set at $2.40? At $2.00? At $3.60?

Price	Q_d	Q_s
$1.60	9,000	5,000
$2.00	8,500	5,500
$2.40	8,000	6,400
$2.80	7,500	7,500
$3.20	7,000	9,000
$3.60	6,500	11,000
$4.00	6,000	15,000

Chapter 4 Exercises

Self-Check Questions

1. In the labor market, what causes a movement along the demand curve? What causes a shift of the demand curve?

2. In the labor market, what causes a movement along the supply curve? What causes a shift of the supply curve?

3. Why is a living wage considered a price floor? Does imposing a living wage have the same outcome as a minimum wage?

4. In the financial market, what causes a movement along the demand curve? What causes a shift in the demand curve?

5. In the financial market, what causes a movement along the supply curve? What causes a shift in the supply curve?

6. If a usury law limits interest rates to no more than $35, what would the likely impact be on the amount of loans made and interest rates paid?

7. Which of the following changes in the financial market will lead to a decline in interest rates? Select all that apply.

   a. A rise in demand

   b. A fall in demand

   c. A rise in supply

   d. A fall in supply

8. Which of the following changes in the financial market will lead to an increase in the quantity of loans made and received? Select all that apply.

   a. A rise in demand

   b. A fall in demand

   c. A rise in supply

   d. A fall in supply

9. Identify the most accurate statement. A price floor will have the largest effect if it is set:

   a. substantially above the equilibrium price

   b. slightly above the equilibrium price

   c. slightly below the equilibrium price

   d. substantially below the equilibrium price

   Sketch all four of these possibilities on a demand and supply diagram to illustrate your answer.

10. Identify the most accurate statement. A price ceiling will have the largest effect:

    a. substantially below the equilibrium price

    b. slightly below the equilibrium price

    c. substantially above the equilibrium price

    d. slightly above the equilibrium price

    Sketch all four of these possibilities on a demand and supply diagram to illustrate your answer.

11. Select the correct answer. A price floor will usually shift:

    a. demand

    b. supply

    c. both

    d. neither

    Illustrate your answer with a diagram.

12. Select the correct answer. A price ceiling will usually shift:

    a. demand

    b. supply

    c. both

    d. neither

Review Questions

13. What is the "price" commonly called in the labor market?

14. Are households demanders or suppliers in the goods market? Are firms demanders or suppliers in the goods market? What about the labor market and the financial market?

15. Name some factors that can cause a shift of the demand curve in labor markets.

16. Name some factors that can cause a shift of the supply curve in labor markets.

17. How do economists define equilibrium in financial markets?

18. What would be a sign of a shortage in financial markets?

19. Would usury laws help or hinder resolution of a shortage in financial markets?

20. Whether the product market or the labor market, what happens to the equilibrium price and quantity for each of the four possibilities: increase in demand, decrease in demand, increase in supply, and decrease in supply?

Critical Thinking Questions

21. Other than the demand for labor, what would be another example of a derived demand?

22. Suppose that a 5% increase in the minimum wage causes a 5% reduction in employment. How would this affect employers and how would it affect workers? In your opinion, would this be a good policy?

23. Under what circumstances would a minimum wage be a nonbinding price floor? Under what circumstances would a living raise be a binding price floor?

24. Suppose the U.S. economy began to grow more rapidly than other countries in the world. What would be the likely impact on U.S. financial markets as part of the global economy?

25. If the government imposed a federal interest rate ceiling of 20% on all loans, who would gain and who would lose?

26. Why are the factors that shift the demand for a product different from the factors that shift the demand for labor? Why are the factors that shift the supply of a product different from those that shift the supply of labor?

27. During a discussion several years ago on building a pipeline to Alaska to carry natural gas, the U.S. Senate passed a bill stipulating that there should be a guaranteed minimum price for the natural gas that would flow through the pipeline. The thinking behind the bill was that if private firms had a guaranteed price for their natural gas, they would be more willing to drill for gas and to pay to build the pipeline.

a. Using the demand and supply framework, predict the effects of this price floor on the price, quantity demanded, and quantity supplied.

b. With the enactment of this price floor for natural gas, what are some of the likely unintended consequences in the market?

c. Suggest some policies, other than the price floor, working within the framework of demand and supply that the government can pursue if it wishes to encourage drilling for natural gas and a new pipeline in Alaska.

Problems

28. Identify each of the following as involving either demand or supply. Draw a circular flow diagram and label the flows *A* through *F*. (Some choices can be on both sides of the goods market.)

- **a.** Households in the labor market
- **b.** Firms in the goods market
- **c.** Firms in the financial market
- **d.** Households in the goods market
- **e.** Firms in the labor market
- **f.** Households in the financial market

29. Predict how each of the following events will raise or lower the equilibrium wage and quantity of oil workers in Texas. In each case, sketch a demand and supply diagram to illustrate your answer.

- **a.** The price of coal rises.
- **b.** New oil-drilling equipment is invented that is cheap and requires few workers to run.
- **c.** Several major companies that do not drill oil open factories in Texas, offering many well-paid jobs.
- **d.** Government imposes costly new regulations to make oil drilling a safer job.

30. Predict how each of the following economic changes will affect the equilibrium price and quantity in the financial market for home loans. Sketch a demand and supply diagram to support your answers.

- **a.** The number of people at the most common ages for home buying increases.
- **b.** People gain confidence that the economy is growing and that their jobs are secure.
- **c.** Banks that have made home loans find that a larger number of people than they expected are not repaying those loans.
- **d.** Because of a threat of war, people become uncertain about their economic future.
- **e.** The overall level of saving in the economy diminishes.
- **f.** The federal government changes its bank regulations in a way that makes it cheaper and easier for banks to make home loans.

31. The table shows the amount of savings and borrowing in a market for loans to purchase homes, measured in millions of dollars, at various interest rates. What is the equilibrium interest rate and quantity in the capital financial market? How can you tell? Now, imagine that because of a shift in the perceptions of foreign investors, the supply curve shifts so that there will be $10 million less supplied at every interest rate. Calculate the new equilibrium interest rate and quantity, and explain why the direction of the interest rate shift makes intuitive sense.

Interest Rate	Quantity Supplied	Quantity Demanded
5%	130	170
6%	135	150
7%	140	140
8%	145	135
9%	150	125
10%	155	110

32. Imagine that to preserve the traditional way of life in small fishing villages, a government decides to impose a price floor that will guarantee all fishermen a certain price for their catch.

a. Using the demand and supply framework, predict the effects on the price, quantity demanded, and quantity supplied.

b. With the enactment of this price floor for fish, what are some of the likely unintended consequences in the market?

c. Suggest some policies other than the price floor, working within the framework of demand and supply, to make it possible for small fishing villages to continue.

33. What happens to the price and the quantity bought and sold in the cocoa market if countries producing cocoa experience a drought and a new study is released demonstrating the health benefits of cocoa? Illustrate your answer with a demand and supply graph.

Chapter 5 Exercises

Self-Check Questions

1. From the data shown in the following table about demand for smart phones, calculate the price elasticity of demand from: Point *B* to Point *C*, Point *D* to Point *E*, and Point *G* to Point *H*. Classify the elasticity at each point as elastic, inelastic, or unit elastic.

Point	Price	Quantity Demanded
A	$60	3,000
B	$70	2,800
C	$80	2,600
D	$90	2,400
E	$100	2,200
F	$110	2,000
G	$120	1,800
H	$130	1,600

2. From the data shown in the following table about supply of alarm clocks, calculate the price elasticity of supply from: Point *J* to Point *K*, Point *L* to Point *M*, and Point *N* to Point *P*. Classify the elasticity at each point as elastic, inelastic, or unit elastic.

Point	Price	Quantity Supplied
J	$8	50
K	$9	70
L	$10	80
M	$11	88
N	$12	95
P	$13	100

3. Why is the demand curve with constant unit elasticity concave?

4. Why is the supply curve with constant unit elasticity a straight line?

5. The federal government decides to require that automobile manufacturers install new anti-pollution equipment that costs $2,000 per car. Under what conditions can carmakers pass almost all of this cost along to car buyers? Under what conditions can carmakers pass very little of this cost along to car buyers?

6. Suppose you are in charge of sales at a pharmaceutical company, and your firm has a new drug that causes bald men to grow hair. Assume that the company wants to earn as much revenue as possible from this drug. If the elasticity of demand for your company's product at the current price is 1.4, would you advise the company to raise the price, lower the price, or to keep the price the same? What if the elasticity were 0.6? What if it were 1? Explain your answer.

7. What would the gasoline price elasticity of supply mean to UPS or FedEx?

8. The average annual income rises from \$25,000 to \$38,000, and the quantity of bread consumed in a year by the average person falls from 30 loaves to 22 loaves. What is the income elasticity of bread consumption? Is bread a normal or an inferior good?

9. Suppose the cross-price elasticity of apples with respect to the price of oranges is 0.4, and the price of oranges falls by 3%. What will happen to the demand for apples?

Review Questions

10. What is the formula for calculating elasticity?

11. What is the price elasticity of demand? Can you explain it in your own words?

12. What is the price elasticity of supply? Can you explain it in your own words?

13. Describe the general appearance of a demand or a supply curve with zero elasticity.

14. Describe the general appearance of a demand or a supply curve with infinite elasticity.

15. If demand is elastic, will shifts in supply have a larger effect on equilibrium quantity or on price?

16. If demand is inelastic, will shifts in supply have a larger effect on equilibrium price or on quantity?

17. If supply is elastic, will shifts in demand have a larger effect on equilibrium quantity or on price?

18. If supply is inelastic, will shifts in demand have a larger effect on equilibrium price or on quantity?

19. Would you usually expect elasticity of demand or supply to be higher in the short run or in the long run? Why?

20. Under which circumstances does the tax burden fall entirely on consumers?

21. What is the formula for the income elasticity of demand?

22. What is the formula for the cross-price elasticity of demand?

23. What is the formula for the wage elasticity of labor supply?

24. What is the formula for elasticity of savings with respect to interest rates?

Critical Thinking Questions

25. Transatlantic air travel in first class has an estimated elasticity of demand of 0.40 less than transatlantic air travel in economy class, with an estimated price elasticity of 0.62. Why do you think this is the case?

26. What is the relationship between price elasticity and position on the demand curve? For example, as you move up the demand curve to higher prices and lower quantities, what happens to the measured elasticity? How would you explain that?

27. Can you think of an industry (or product) with near infinite elasticity of supply in the short term? That is, what is an industry that could increase Q_s almost without limit in response to an increase in the price?

28. Would you expect supply to play a more significant role in determining the price of a basic necessity like food or a luxury like perfume? Explain. (*Hint*: think about how the price elasticity of demand will differ between necessities and luxuries.)

29. A city has built a bridge over a river and it decides to charge a toll to everyone who crosses. For one year, the city charges a variety of different tolls and records information on how many drivers cross the bridge. The city thus gathers information about elasticity of demand. If the city wishes to raise as much revenue as possible from the tolls, where will the city decide to charge a toll: in the inelastic portion of the demand curve, the elastic portion of the demand curve, or the unit elastic portion? Explain.

30. In a market where the supply curve is perfectly inelastic, how does an excise tax affect the price paid by consumers and the quantity bought and sold?

31. Economists define normal goods as having a positive income elasticity. We can divide normal goods into two types: Those whose income elasticity is less than one and those whose income elasticity is greater than one. Think about products that would fall into each category. Can you come up with a name for each category?

32. Suppose you could buy shoes one at a time, rather than in pairs. What do you predict the cross-price elasticity for left shoes and right shoes would be?

Problems

33. The equation for a demand curve is $P = 48 - 3Q$. What is the elasticity in moving from a quantity of 5 to a quantity of 6?

34. The equation for a demand curve is $P = \frac{2}{Q}$. What is the elasticity of demand as price falls from \$5 to \$4? What is the elasticity of demand as the price falls from \$9 to \$8? Would you expect these answers to be the same? First solve for Q at both prices:

35. The equation for a supply curve is $4P = Q$. What is the elasticity of supply as price rises from \$3 to \$4? What is the elasticity of supply as the price rises from \$7 to \$3? Would you expect these answers to be the same?

36. The equation for a supply curve is $P = 3Q - 8$. What is the elasticity in moving from a pr ice of \$4 to a price of \$7?

37. The supply of paintings by Leonardo da Vinci, who painted the *Mona Lisa* and *The Last Supper* and died in 1519, is highly inelastic. Sketch a supply and demand diagram, paying attention to the appropriate elasticities, to illustrate that demand for these paintings will determine the price.

38. Say that a certain stadium for professional football has seventy thousand seats. What is the shape of the supply curve for tickets to football games at that stadium? Explain.

39. When someone's kidneys fail, the person needs to have medical treatment with a dialysis machine (unless or until they receive a kidney transplant) or they will die. Sketch a supply and demand diagram, paying attention to the appropriate elasticities, to illustrate that the supply of such dialysis machines will primarily determine the price.

40. Assume that the supply of low-skilled workers is fairly elastic, but the employers' demand for such workers is fairly inelastic. If the policy goal is to expand employment for low-skilled workers, is it better to focus on policy tools to shift the supply of unskilled labor or on tools to shift the demand for unskilled labor? What if the policy goal is to raise wages for this group? Explain your answers with supply and demand diagrams.

Chapter 6 Exercises

Self-Check Questions

1. Jeremy is deeply in love with Jasmine. Jasmine lives where cell phone coverage is poor, so he can either call her on the phone for $0.10 per minute, or he can drive to see her at a round-trip cost of $4 in gasoline money. He has a total of $20 per week to spend on staying in touch. To make his preferred choice, Jeremy uses a handy utilimometer that measures his total utility from personal visits and phone minutes. Using the values in the following table, determine the points on Jeremy's consumption choice budget constraint (it may be helpful to do a sketch) and identify his utility-maximizing point.

Round Trips	Total Utility	Phone Minutes	Total Utility
0	0	0	0
1	80	20	200
2	150	40	380
3	210	60	540
4	260	80	680
5	300	100	800
6	330	120	900
7	200	140	980
8	180	160	1,040
9	160	180	1,080
10	140	200	1,100

2. Take Jeremy's total utility information in Question 1, and use the marginal utility approach to confirm the choice of phone minutes and round trips that maximizes Jeremy's utility.

3. Explain all the reasons why a decrease in a product's price would lead to an increase in purchases.

4. As a college student, you work a part-time job, but your parents also send you a monthly allowance. Suppose one month, your parents forget to send the check. Show graphically how your budget constraint is affected. Assuming you only buy normal goods, what would happen to your purchases of goods?

Review Questions

5. Who determines how much utility an individual will receive from consuming a good?

6. Would you expect total utility to rise or fall with additional consumption of a good? Why?

7. Would you expect marginal utility to rise or fall with additional consumption of a good? Why?

8. Is it possible for total utility to increase while marginal utility diminishes? Explain.

9. If people do not have a complete mental picture of total utility for every level of consumption, how can they find their utility-maximizing consumption choice?

10. What is the rule relating the ratio of marginal utility to prices of two goods at the optimal choice? Explain why, if this rule does not hold, the choice cannot be utility-maximizing.

11. As a general rule, is it safe to assume that a change in the price of a good will always have its most significant impact on the quantity demanded of that good rather than on the quantity demanded of other goods? Explain.

12. Why does a change in income cause a parallel shift in the budget constraint?

Critical Thinking Questions

13. Think back to a purchase that you made recently. How would you describe your thinking before you made that purchase?

14. The rules of politics are not always the same as the rules of economics. In discussions of setting budgets for government agencies, there is a strategy called "closing the Washington Monument." When an agency faces the unwelcome prospect of a budget cut, it may decide to close a high-visibility attraction enjoyed by many people (like the Washington Monument). Explain in terms of diminishing marginal utility why the Washington Monument strategy is so misleading. (*Consider*: if you are really trying to make the best of a budget cut, should you cut the items in your budget with the highest marginal utility or the lowest marginal utility? Does the Washington Monument strategy cut the items with the highest marginal utility or the lowest marginal utility?)

15. Income effects depend on the income elasticity of demand for each good that you buy. If one of the goods you buy has a negative income elasticity (that is, it is an inferior good), what must be true of the income elasticity of the other good you buy?

Problems

16. Praxilla, who lives in ancient Greece, derives utility from reading poems and eating cucumbers. Praxilla gets 30 units of marginal utility from her first poem, 27 units of marginal utility from her second poem, 24 units of marginal utility from her third poem, and so on, with marginal utility declining by 3 units for each additional poem. Praxilla gets 6 units of marginal utility for each of her first 3 cucumbers consumed, 5 units of marginal utility for each of her next 3 cucumbers consumed, 4 units of marginal utility for each of the following 3 cucumbers consumed, and so on, with marginal utility declining by 1 for every 3 cucumbers consumed. A poem costs 3 bronze coins, but a cucumber costs only 1 bronze coin. Praxilla has 18 bronze coins. Sketch Praxilla's budget set between poems and cucumbers, placing poems on the vertical axis and cucumbers on the horizontal axis. Start off with the choice of 0 poems and 18 cucumbers, and calculate the changes in marginal utility of moving along the budget line to the next choice of 1 poem and 15 cucumbers. Using this step-by-step process based on marginal utility, create a table and identify Praxilla's utility-maximizing choice. Compare the marginal utility of the two goods and the relative prices at the optimal choice to see if the expected relationship holds. (*Hint*: label the table columns: 1) Choice, 2) Total Utility, 3) Marginal Gain from More Poems, 4) Marginal Loss from Fewer Cucumbers, 5) Overall Gain or Loss, 6) Is the previous choice optimal? Label the table rows (underneath the column titles): 1) 0 poems and 18 cucumbers, 2) 1 poem and 15 cucumbers, 3) 2 poems and 12 cucumbers, 4) 3 poems and 9 cucumbers, 5) 4 poems and 6 cucumbers, 6) 5 poems and 3 cucumbers, 7) 6 poems and 0 cucumbers.)

17. If a 10% decrease in the price of one product that you buy causes an 8% increase in quantity demanded of that product, will another 10% decrease in the price cause another 8% increase (no more and no less) in quantity demanded?

Chapter 7 Exercises

Self-Check Questions

1. What happens to the budget constraint when income increases? What happens when income decreases?
2. What does the marginal rate of substitution measure?
3. What is diminishing marginal utility?
4. Explain why individuals have unique indifference curves.
5. What is the shape of an indifference curve? What does that tell you?

Review Questions

6. What point is preferred along an indifference curve?
7. Why do indifference curves slope down?
8. Why are indifference curves steeper on the left and flatter on the right?
9. How many indifference curves does a person have?
10. What is the substitution effect?
11. What is the income effect?
12. How can you tell which indifference curves represent higher or lower levels of utility?
13. Does a change in price have both an income effect and a substitution effect? Does a change in income have both an income effect and a substitution effect?
14. Which is larger, the income effect or the substitution effect?

Critical Thinking Questions

15. Does the income effect involve a change in income? Explain.
16. Would you expect, in some cases, to see only an income effect or only a substitution effect? Explain.
17. How do indifference curves apply when you are making intertemporal choices?
18. How would you graph a sudden increase in budget? Does this affect your utility-maximizing point? Why or why not?
19. Why is the utility-maximizing point always the point where an indifference curve is tangent to the budget constraint?

Problems

20. Recall the example that discusses Lilly's tradeoff between her two favorite relaxation activities: eating doughnuts and reading paperback books. Suppose the price of paperback books increases to \$15 and the price of doughnuts stays at \$1. Her total budget is \$120.

a. Graph her budget constraint placing books on the *x*-axis.

b. Lilly chooses to buy 4 books and 60 doughnuts. Label this decision as Point *A* on your graph. Next, draw an indifference curve labeled U_1 that reflects this decision.

c. Plot any other point along this indifference curve and label it Point *B*. Discuss if Point *B* is an achievable purchase decision for Lilly and what her preference is for Point *B* versus Point *A*.

d. Draw two more indifference curves, one labeled U_2 that is beyond Lilly's budget constraint and one labeled U_3 that is affordable but not desirable.

21. Chelsea is indifferent between Option A of receiving 15 brownies and 14 cookies and Option B of 17 brownies and 10 cookies. What is Chelsea's marginal rate of substitution of brownies in place of cookies moving from Option A to Option B?

22. Ezra currently has \$12,000 saved. He is trying to decide whether to use it today as a down payment on a used car or to wait four years, during which he can earn a 25% rate of return for the entire four-year period. If he waits four years, he will have a larger down payment so that he can purchase a new electric car.

a. If Ezra saves the entire amount, how much will he earn in interest? How much will he have available for consumption in four years?

b. If Ezra spends \$2,000 now, how much will he earn as his rate of return? How much will he have available for consumption in four years?

Chapter 8 Exercises

Self-Check Questions

1. A firm had sales revenue of $1 million last year. It spent $600,000 on labor, $150,000 on capital, and $200,000 on materials. What was the firm's accounting profit?

2. Continuing from Exercise 1, the firm's factory sits on land owned by the firm that could be rented out for $30,000 per year. What was the firm's economic profit last year?

3. The WipeOut Ski Company manufactures skis for beginners. Fixed costs are $30. Fill in the following table for total cost, average variable cost, average total cost, and marginal cost.

Quantity	Variable Cost	Fixed Cost	Total Cost	Average Variable Cost	Average Total Cost	Marginal Cost
0	0	$30				
1	$10	$30				
3	$25	$30				
3	$45	$30				
4	$70	$30				
5	$100	$30				
6	$135	$30				

4. Based on your answers to the prior question, now imagine a situation where WipeOut Ski Company produces a quantity of 5 units that it sells for a price of $25 each.
   a. What will be the company's profits or losses?
   b. How can you tell at a glance whether the company is making or losing money at this price by looking at average cost?
   c. At the given quantity and price, is the marginal unit produced adding to profits?

5. If 2 painters can paint 200 square feet of wall in an hour, and 3 painters can paint 275 square feet, what is the marginal product of the third painter?

6. Consider the following tables. If the cost of labor remains at $40, but the cost of a machine decreases from $80 to $40, what would be the total cost of each method of production? Which method should the firm use, and why?

Production Technology 1	10 workers	2 machines
Production Technology 2	7 workers	4 machines
Production Technology 3	3 workers	7 machines

Example A: Workers cost $40, machines cost $80

	Labor Cost	Machine Cost	Total Cost
Cost of Technology 1	10 × $40 = $400	2 × $80 = $160	$560
Cost of Technology 2	7 × $40 = $280	4 × $80 = $320	$600
Cost of Technology 3	3 × $40 = $120	7 × $80 = $560	$680

Example B: Workers cost $55, machines cost $80

	Labor Cost	Machine Cost	Total Cost
Cost of Technology 1	10 × $55 = $550	2 × $80 = $160	$710
Cost of Technology 2	7 × $55 = $385	4 × $80 = $320	$705
Cost of Technology 3	3 × $55 = $165	7 × $80 = $560	$725

Example C: Workers cost $90, machines cost $80

	Labor Cost	Machine Cost	Total Cost
Cost of Technology 1	10 × $90 = $900	2 × $80 = $160	$1600
Cost of Technology 2	7 × $90 = $630	4 × $80 = $320	$950
Cost of Technology 3	3 × $90 = $270	7 × $80 = $560	$830

7. Suppose the cost of machines increases to $55, while the cost of labor stays at $40. How would that affect the total cost of the three methods? Which method should the firm choose now?

8. Automobile manufacturing is an industry subject to significant economies of scale. Suppose there are 4 domestic car manufacturers, but the demand for domestic cars is no more than 2.5 times the quantity produced at the bottom of the long-run average cost curve. What do you expect will happen to the domestic car industry in the long run?

Review Questions

9. What are explicit and implicit costs?
10. Would you consider an interest payment on a loan to be an explicit or implicit cost?
11. What is the difference between accounting and economic profit?
12. What is a production function?
13. What is the difference between a fixed input and a variable input?
14. How do we calculate marginal product?
15. What shapes would you generally expect a total product curve and a marginal product curve to have?
16. What are the factor payments for land, labor, and capital?
17. What is the difference between fixed costs and variable costs?
18. How do we calculate each of the following: marginal cost, average total cost, and average variable cost?
19. What shapes would you generally expect each of the following cost curves to have: fixed costs, variable costs, marginal costs, average total costs, and average variable costs?
20. Are there fixed costs in the long run? Explain briefly.
21. Are fixed costs also sunk costs? Explain.
22. What are diminishing marginal returns as they relate to costs?
23. Which costs are measured on a per-unit basis: fixed costs, average cost, average variable cost, variable costs, and marginal cost?
24. What is a production technology?
25. In choosing a production technology, how will firms react if one input becomes relatively more expensive?
26. What is a long-run average cost curve?
27. What is the difference between economies of scale, constant returns to scale, and diseconomies of scale?
28. What shape of a long-run average cost curve illustrates economies of scale, constant returns to scale, and diseconomies of scale?
29. Why will firms in most markets be located at or close to the bottom of the long-run average cost curve?

Critical Thinking Questions

30. Small mom-and-pop firms, like inner city grocery stores, sometimes exist even though they do not earn economic profits. How can you explain this?
31. A common name for fixed cost is *overhead*. If you divide fixed cost by the quantity of output produced, you get average fixed cost. Supposed fixed cost is $1,000. What does the average fixed cost curve look like? Use your response to explain what “spreading the overhead” means.
32. How does fixed cost affect marginal cost? Why is this relationship important?
33. Average cost curves (except for average fixed cost) tend to be U-shaped, decreasing and then increasing. Marginal cost curves have the same shape, though this may be harder to see since most of the marginal cost curve is increasing. Why do you think that average and marginal cost curves have the same general shape?
34. What is the relationship between marginal product and marginal cost? (*Hint*: look at the curves.) Why do you suppose that is?
35. It is clear that businesses operate in the short run, but do they ever operate in the long run? Discuss.

36. Consider the following table. In the top half of the table (for $K = 1$ PC), at what point does diminishing marginal productivity kick in? What about in the bottom half of the table (for $K = 3$ PC)? How do you explain this?

# Typists (*L*)	1	2	3	4	5	5	
Letters/hr (*TP*)	5	6	8	8	8	8	For *K* = 1 PC
MP	5	2	1	0	0	0	
Letters/hr (*TP*)	5	10	15	17	18	18	For *K* = 3 PC
MP	5	5	5	2	1	0	

37. How would an improvement in technology, like the high-efficiency gas turbines or Pirelli tire plant, affect the long-run average cost curve of a firm? Can you draw the old curve and the new one on the same axes? How might such an improvement affect other firms in the industry?

38. Do you think that the taxicab industry in large cities would be subject to significant economies of scale? Why or why not?

Problems

39. A firm is considering an investment that will earn a 6% rate of return. If it were to borrow the money, it would have to pay 8% interest on the loan, but it currently has the cash, so it will not need to borrow. Should the firm make the investment?

40. Return to Table 3 and Figure 2 in Lesson 8.3. What is the marginal gain in output from increasing the number of barbers from 4 to 5 and from 5 to 6? Does it continue the pattern of diminishing marginal returns?

41. Return to Table 3 in Lesson 8.3. Compute the average total cost, average variable cost, and marginal cost of producing 60 and 72 haircuts. Draw the graph of the three curves between 60 and 72 haircuts.

42. A small company that shovels sidewalks and driveways has 100 homes signed up for its services this winter. It can use various combinations of capital and labor: lots of labor with hand shovels, less labor with snow blowers, and still less labor with a pickup truck that has a snowplow on front. To summarize, the method choices are:

Method 1: 50 units of labor, 10 units of capital

Method 2: 20 units of labor, 40 units of capital

Method 3: 10 units of labor, 70 units of capital

If hiring labor for the winter costs \$100/unit and a unit of capital costs \$400, what production method should be chosen? What method should be chosen if the cost of labor rises to \$200/unit?

Chapter 9 Exercises

Self-Check Questions

1. Firms in a perfectly competitive market are said to be price takers—that is, once the market determines an equilibrium price for the product, firms must accept this price. If you sell a product in a perfectly competitive market, but you are not happy with its price, would you raise the price, even by a cent?

2. Would independent trucking fit the characteristics of a perfectly competitive industry? Explain your reasoning.

3. Consider the following table. What would happen to the firm's profits if the market price increases from $4 to $6 per pack of raspberries?

Quantity	Total Cost	Fixed Cost	Variable Cost	Total Revenue	Total Profit
0	$62	$62	-	$0	–$62
10	$90	$62	$28	$60	–$30
20	$110	$62	$48	$120	$10
30	$126	$62	$64	$180	$54
40	$144	$62	$82	$240	$96
50	$166	$62	$104	$300	$134
60	$192	$62	$130	$360	$168
70	$224	$62	$162	$420	$196
80	$264	$62	$202	$480	$216
90	$324	$62	$262	$540	$216
100	$404	$62	$342	$600	$196

4. Consider the following table. Suppose the market price increases from $4 to $6. What would happen to the profit-maximizing output level?

Quantity	Total Cost	Fixed Cost	Variable Cost	Marginal Cost	Total Revenue	Marginal Revenue
0	$62	$62	-	-	$0	-
10	$90	$62	$28	$2.80	$60	$6.00
20	$110	$62	$48	$2.00	$120	$6.00
30	$126	$62	$64	$1.60	$180	$6.00
40	$144	$62	$82	$1.80	$240	$6.00
50	$166	$62	$104	$2.20	$300	$6.00
60	$192	$62	$130	$2.60	$360	$6.00
70	$224	$62	$162	$3.20	$420	$6.00
80	$264	$62	$202	$4.00	$480	$6.00
90	$324	$62	$262	$6.00	$540	$6.00
100	$404	$62	$342	$8.00	$600	$6.00

5. Explain in words why a profit-maximizing firm will not choose to produce at a quantity where marginal cost exceeds marginal revenue.

6. A firm's marginal cost curve above the average variable cost curve is equal to the firm's individual supply curve. This means that every time a firm receives a price from the market, it will be willing to supply the amount of output where the price equals marginal cost. What happens to the firm's individual supply curve if marginal costs increase?

7. If new technology in a perfectly competitive market causes a substantial reduction in costs of production, how will this affect the market?

8. A market in perfect competition is in long-run equilibrium. What happens to the market if labor unions are able to increase wages for workers?

9. Productive efficiency and allocative efficiency are two concepts met in the long run in a perfectly competitive market. These are the two reasons why we call them "perfect." How would you use these two concepts to analyze other market structures and label them "imperfect"?

10. Explain how the profit-maximizing rule of setting $\frac{\$3-\$5}{1} = -\$2$ leads a perfectly competitive market to be allocatively efficient.

Review Questions

11. A single firm in a perfectly competitive market is relatively small compared to the rest of the market. What does this mean? How small is "small"?

12. What are the four basic assumptions of perfect competition? Explain in words what they imply for a perfectly competitive firm.

13. What is a price-taker firm?

14. How does a perfectly competitive firm decide what price to charge?

15. What prevents a perfectly competitive firm from seeking higher profits by increasing the price it charges?

16. How does a perfectly competitive firm calculate total revenue?

17. Briefly explain the reason for the shape of a marginal revenue curve for a perfectly competitive firm.

18. What two rules does a perfectly competitive firm apply to determine its profit-maximizing quantity of output?

19. How does the average cost curve help to show whether a firm is making profits or losses?

20. What two lines on a cost curve diagram intersect at the zero-profit point?

21. Should a firm shut down immediately if it is making losses?

22. How does the average variable cost curve help a firm know whether it should shut down immediately?

23. What two lines on a cost curve diagram intersect at the shutdown point?

24. Why does entry occur?

25. Why does exit occur?

26. Do entry and exit occur in the short run, the long run, both, or neither?

27. What price will a perfectly competitive firm end up charging in the long run? Why?

28. Will a perfectly competitive market display productive efficiency? Why or why not?

29. Will a perfectly competitive market display allocative efficiency? Why or why not?

Critical Thinking Questions

30. Finding a life partner is a complicated process that may take many years. It is hard to think of this process as being part of a very complex market, with a demand and a supply for partners. Think about how this market works and some of its characteristics, such as search costs. Would you consider it a perfectly competitive market?

31. Can you name five examples of perfectly competitive markets? Why or why not?

32. Your company operates in a perfectly competitive market. You have been told that advertising can help you increase your sales in the short run. Would you create an aggressive advertising campaign for your product?

33. Since a perfectly competitive firm can sell as much as it wishes at the market price, why can the firm not simply increase its profits by selling an extremely high quantity?

34. Many firms in the United States file for bankruptcy every year, yet they still continue operating. Why would they do this instead of completely shutting down?

35. Why will profits for firms in a perfectly competitive industry tend to vanish in the long run?

36. Why will losses for firms in a perfectly competitive industry tend to vanish in the long run?

37. Assuming that the market for cigarettes is in perfect competition, what does allocative and productive efficiency imply in this case? What does it not imply?

38. In the argument for why perfect competition is allocatively efficient, the price that people are willing to pay represents the gains to society, and the marginal cost to the firm represents the costs to society. Can you think of some social costs or issues that are not included in the marginal cost to the firm or some social gains that are not included in what people pay for a good?

Problems

39. The AAA Aquarium Co. sells aquariums for \$20 each. Fixed costs of production are \$20. The total variable costs are \$20 for 1 aquarium, \$25 for 2 units, \$35 for 3 units, \$50 for 4 units, and \$80 for 5 units. In the form of a table, calculate total revenue, marginal revenue, total cost, and marginal cost for each output level (1 to 5 units). What is the profit-maximizing quantity of output? On one diagram, sketch the total revenue and total cost curves. On another diagram, sketch the marginal revenue and marginal cost curves.

40. Perfectly competitive firm Doggies Paradise Inc. sells winter coats for dogs. Dog coats sell for \$72 each. The fixed costs of production are \$100. The total variable costs are \$64 for 1 unit, \$84 for 2 units, \$114 for 3 units, \$184 for 4 units, and \$270 for 5 units. In the form of a table, calculate total revenue, marginal revenue, total cost, and marginal cost for each output level (1 to 5 units). On one diagram, sketch the total revenue and total cost curves. On another diagram, sketch the marginal revenue and marginal cost curves. What is the profit-maximizing quantity?

41. A computer company produces affordable, easy-to-use home computer systems and has fixed costs of \$250. The marginal cost of producing computers is \$700 for the first computer, \$250 for the second, \$300 for the third, \$350 for the fourth, \$400 for the fifth, \$450 for the sixth, and \$500 for the seventh.

a. Create a table that shows the company's output, total cost, marginal cost, average cost, variable cost, and average variable cost.

b. At what price is the zero-profit point? At what price is the shutdown point?

c. If the company sells the computers for \$500, is it making a profit or a loss? How big is the profit or loss? Sketch a graph with *AC, MC*, and *AVC* curves to illustrate your answer and show the profit or loss.

d. If the firm sells the computers for \$300, is it making a profit or a loss? How big is the profit or loss? Sketch a graph with *AC*, *MC*, and *AVC* curves to illustrate your answer and show the profit or loss.

Chapter 10 Exercises

Self-Check Questions

1. Classify the following as a government-enforced barrier to entry, a barrier to entry that is not government-enforced, or a situation that does not involve a barrier to entry.
   a. A patented invention
   b. A popular but easily copied restaurant recipe
   c. An industry where economies of scale are very small compared to the size of demand in the market
   d. A well-established reputation for slashing prices in response to new entry
   e. A well-respected brand name that has been carefully built up over many years
2. Classify the following as a government-enforced barrier to entry, a barrier to entry that is not government-enforced, or a situation that does not involve a barrier to entry.
   a. A city passes a law on how many licenses it will issue for taxicabs
   b. A city passes a law that all taxicab drivers must pass a driving safety test and have insurance
   c. A well-known trademark
   d. Owning a spring that offers very pure water
   e. An industry where economies of scale are very large compared to the size of demand in the market
3. Suppose the local electrical utility, a legal monopoly based on economies of scale, was split into four firms of equal size, with the idea that eliminating the monopoly would promote competitive pricing of electricity. What do you anticipate would happen to prices?
4. If Congress reduced the period of patent protection from twenty years to ten years, what would likely happen to the amount of private research and development?
5. Suppose demand for a monopoly's product falls so that its profit-maximizing price is below average variable cost. How much output should the firm supply? *Hint*: draw the graph.
6. Imagine a monopolist could charge a different price to every customer based on how much they were willing to pay. How would this affect monopoly profits?

Review Questions

7. How is a monopoly different from perfect competition?
8. What is a barrier to entry? Give some examples.
9. What is a natural monopoly?
10. What is a legal monopoly?
11. What is predatory pricing?
12. How is intellectual property different from other property?
13. By what legal mechanisms is intellectual property protected?
14. In what sense is a natural monopoly "natural"?
15. How is the demand curve perceived by a perfectly competitive firm different from the demand curve perceived by a monopolist?
16. How does the demand curve perceived by a monopolist compare with the market demand curve?
17. Is a monopolist a price taker? Explain briefly.
18. What is the usual shape of a total revenue curve for a monopolist? Why?

19. What is the usual shape of a marginal revenue curve for a monopolist? Why?

20. How can a monopolist identify the profit-maximizing level of output if it knows its total revenue and total cost curves?

21. How can a monopolist identify the profit-maximizing level of output if it knows its marginal revenue and marginal costs?

22. When a monopolist identifies its profit-maximizing quantity of output, how does it decide what price to charge?

23. Is a monopolist allocatively efficient? Why or why not?

24. How does the quantity produced and price charged by a monopolist compare to that of a perfectly competitive firm?

Critical Thinking Questions

25. ALCOA does not have the monopoly power it once had. How do you suppose their barriers to entry were weakened?

26. Why are generic pharmaceuticals significantly cheaper than name-brand ones?

27. For many years, the Justice Department has tried to break up large firms like IBM, Microsoft, and most recently Google, on the grounds that their large market share made them essentially monopolies. In a global market, where U.S. firms compete with firms from other countries, would this policy make the same sense as it might in a purely domestic context?

28. Intellectual property laws are intended to promote innovation, but some economists, such as Milton Friedman, have argued that such laws are not desirable. In the United States, there is no intellectual property protection for food recipes or fashion designs. Considering the state of these two industries, and bearing in mind the discussion of the inefficiency of monopolies, can you think of any reasons why intellectual property laws might hinder innovation in some cases?

29. Imagine that you are managing a small firm and thinking about entering the market of a monopolist. The monopolist is currently charging a high price, and you have calculated that you can make a nice profit charging $10 less than the monopolist. Before you challenge the monopolist, what possibility should you consider for how the monopolist might react?

30. If a monopoly firm is earning profits, how much would you expect these profits to be diminished by entry in the long run?

Problems

31. Return to Figure 3 in Lesson 10.1. Suppose P_0 is \$10, and P_1 is \$11. Suppose a new firm with the same *LRAC* curve as the incumbent tries to break into the market by selling 4,000 units of output. Estimate from the graph what the new firm's average cost of production would be. If the incumbent continues to produce 6,000 units, how much output would be supplied to the market by the two firms? Estimate what would happen to the market price as a result of the supply of both the incumbent firm and the new entrant. Approximately how much profit would each firm earn?

32. Draw the demand, marginal revenue, and marginal cost curves from Figure 4 in Lesson 10.2, and identify the quantity of output the monopoly wishes to supply and the price it will charge. Suppose demand for the monopoly's product increases dramatically. Draw the new demand curve. What happens to the marginal revenue as a result of the increase in demand? What happens to the marginal cost curve? Identify the new profit-maximizing quantity and price. Does the answer make sense to you?

33. Draw a monopolist's demand, marginal revenue, and marginal cost curves. Identify the monopolist's profit-maximizing output level. Now, think about a slightly higher level of output (say Q_0+1). According to the graph, is there any consumer willing to pay more than the marginal cost of that new level of output? If so, what does this mean?

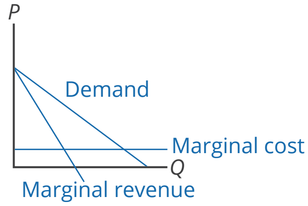
Chapter 11 Exercises

Self-Check Questions

1. Suppose that, due to a successful advertising campaign, a monopolistic competitor experiences an increase in demand for its product. How will that affect the price it charges and the quantity it supplies?

2. Continuing with the scenario outlined in Question 1, in the long run, the positive economic profits earned by the monopolistic competitor will attract a response either from existing firms in the industry or firms outside. As those firms capture the original firm's profit, what will happen to the original firm's profit-maximizing price and output levels?

3. Consider the curve shown in the following graph, which shows the market demand, marginal cost, and marginal revenue curves for firms in an oligopolistic industry.



   a. Suppose the firms collude to form a cartel. What price will the cartel charge? What quantity will the cartel supply? How much profit will the cartel earn?

   b. Suppose now that the cartel breaks up, and the oligopolistic firms compete as vigorously as possible by cutting price and increasing sales. What will the industry quantity and price be? What will the collective profits be of all firms in the industry?

   c. Compare the equilibrium price, quantity, and profit for the cartel and cutthroat competition outcomes.

4. Sometimes, oligopolies in the same industry are very different in size. Suppose we have a duopoly where one firm (Firm A) is large and the other firm (Firm B) is small, as shown in the prisoner's dilemma in the following table.

	Firm B Colludes with Firm A	**Firm B Cheats by Selling More Output**
Firm A Colludes with Firm B	A gets $1,000, B gets $100	A gets $800, B gets $200
Firm A Cheats by Selling More Output	A gets $1,050, B gets $50	A gets $500, B gets $20

   Assuming that the payoffs are known to both firms, what is the likely outcome in this case?

Review Questions

5. What is the relationship between product differentiation and monopolistic competition?

6. How is the perceived demand curve for a monopolistically competitive firm different from the perceived demand curve for a monopoly or a perfectly competitive firm?

7. How does a monopolistic competitor choose its profit-maximizing quantity of output and price?

8. How can a monopolistic competitor tell whether the price it is charging will cause the firm to earn profits or experience losses?

9. If the firms in a monopolistically competitive market are earning economic profits or losses in the short run, would you expect them to continue doing so in the long run? Why?

10. Is a monopolistically competitive firm productively efficient? Is it allocatively efficient? Why or why not?

11. Will the firms in an oligopoly act more like a monopoly or more like competitors? Briefly explain.

12. Does each individual in a prisoner's dilemma benefit more from cooperation or from pursuing self-interest? Explain briefly.

13. What stops oligopolists from acting together as a monopolist and earning the highest possible level of profits?

Critical Thinking Questions

14. Aside from advertising, how can monopolistically competitive firms increase demand for their products?

15. Make a case for why monopolistically competitive industries never reach long-run equilibrium.

16. Would you rather have efficiency or variety? One opportunity cost of variety is that each product costs more per unit than if there were only one kind of product of a given type, like shoes. Perhaps a better question is, "What is the right amount of variety? Can there be too many varieties of shoes, for example?"

17. Would you expect the kinked demand curve to be more extreme (like a right angle) or less extreme (like a normal demand curve) if each firm in the cartel produces a near-identical product, like OPEC and petroleum? What if each firm produces a somewhat different product? Explain your reasoning.

18. When OPEC raised the price of oil dramatically in the mid-1970s, experts said it was unlikely that the cartel could stay together over the long term—the incentives for individual members to cheat would become too strong. More than forty years later, OPEC still exists. Why do you think OPEC has been able to beat the odds and continue to collude? (*Hint*: you may wish to consider noneconomic reasons.)

Problems

19. Andrea's Day Spa begins offering a relaxing aromatherapy treatment. The firm asks you how much to charge to maximize profits. The demand curve for the treatments is given by the first two columns in the following table; its total costs are given in the third column. For each level of output, calculate total revenue, marginal revenue, average cost, and marginal cost. What is the profit-maximizing level of output for the treatments, and how much will the firm earn in profits?

Price	Quantity	Total Cost
$25.00	0	$130
$24.00	10	$275
$23.00	20	$435
$22.50	30	$610
$22.00	40	$800
$21.60	50	$1,005
$21.20	60	$1,225

20. Mary and Raj are the only two farmers who provide organically grown corn to a local grocery store. They know that if they cooperate and produce less corn, they could raise the price of the corn. If they work independently, they will each earn $100. If they decide to work together and both lower their output, they can each earn $150. If one person lowers output and the other does not, the person who lowers output will earn $0, and the other person will capture the entire market and earn $200. The following table represents the choices available to Mary and Raj. What is the best choice for Raj if he is sure that Mary will cooperate? If Mary thinks Raj will cheat, what should Mary do and why? What is the prisoner's dilemma result? What is the preferred choice if they could ensure cooperation? A = work independently; B = cooperate and lower output. (Each results entry lists Raj's earnings first and Mary's earnings second.)

		Mary	
		A	**B**
Raj	**A**	($100, $100)	($200, $0)
	B	($0, $200)	($150, $150)

21. Jane and Bill are apprehended for a bank robbery. They are taken into separate rooms and questioned by the police about their involvement in the crime. The police tell each that if they confess and turn the other person in, they will receive a lighter sentence. If they both confess, they will both be sentenced to 30 years. If neither confesses, they will each receive a 20-year sentence. If only one confesses, the confessor will receive 15 years, and the one who stayed silent will receive 35 years. The following table represents the choices available to Jane and Bill. If Jane trusts Bill to stay silent, what should she do? If Jane thinks that Bill will confess, what should she do? Does Jane have a dominant strategy? Does Bill have a dominant strategy? A = confess; B = stay silent. (Each results entry lists Bill's sentence first [in years] and Jane's sentence second.)

		Jane	
		A	**B**
Bill	**A**	(30, 30)	(15, 35)
	B	(35, 15)	(20, 20)

Chapter 12 Exercises

Self-Check Questions

1. Is it true that both the four-firm concentration ratio and the Herfindahl-Hirschman Index can be affected by a merger between two firms that are not already in the top four by size? Explain briefly.

2. Is it true that the four-firm concentration ratio puts more emphasis on one or two very large firms, while the Herfindahl-Hirschman Index puts more emphasis on all the firms in the entire market? Explain briefly.

3. Some years ago, two intercity bus companies, Greyhound Lines, Inc. and Trailways Transportation System, wanted to merge. One possible definition of the market in this case was “the market for intercity bus service.” Another possible definition was “the market for intercity transportation, including personal cars, car rentals, passenger trains, and commuter air flights.” Which definition do you think the bus companies preferred, and why?

4. As a result of globalization and new information and communications technology, would you expect the definitions of markets used by antitrust authorities to become broader or narrower?

5. Why would a firm choose to use one or more of the anticompetitive practices described in Lesson 12.2?

6. Urban transit systems, especially those with rail systems, typically experience significant economies of scale in operation. Consider the transit system whose data is given in the following table. Note that the quantity is in millions of riders.

Draw the demand, marginal revenue, marginal cost, and average cost curves. Do they have the normal shapes you would expect for these curves?

Quantity	Price	Marginal Revenue	Marginal Cost	Average Cost
1	10	10	9	9.0
2	9	8	6	7.5
3	8	6	5	6.7
4	7	4	3	5.8
5	6	2	2	5.0
6	5	0	3	4.7
7	4	−2	4	4.6
8	3	−4	5	4.6
9	2	−6	7	4.9
10	1	−8	10	5.4

7. From the graph you drew to answer the previous question, would you say this transit system is a natural monopoly?

Use the following information to answer the next three questions.

In the years before wireless phones, when telephone technology required having a wire running to every home, it seemed plausible that telephone service had diminishing average costs and might need to be regulated like a natural monopoly. For most of the twentieth century, the national U.S. phone company was AT&T, and the company functioned as a regulated monopoly. Think about the deregulation of the U.S. telecommunications industry that has happened over the last few decades. (This is not a research assignment but rather a thought assignment based on what you have learned in this chapter.)

8. What real-world changes made the deregulation possible?
9. What are some of the benefits of the deregulation?
10. What might some of the negatives of deregulation be?

Review Questions

11. What is a corporate merger? What is an acquisition?
12. What is the goal of antitrust policies?
13. How do we measure a four-firm concentration ratio? What does a high measure mean about the extent of competition?
14. How is a Herfindahl-Hirschman Index measured? What does a low measure mean about the extent of competition?
15. Why can it be difficult to decide what a “market” is for purposes of measuring competition?
16. What is a minimum resale price maintenance agreement? How might it reduce competition, and when might it be acceptable?
17. What is exclusive dealing? How might it reduce competition, and when might it be acceptable?
18. What is a tying sale? How might it reduce competition, and when might it be acceptable?
19. What is predatory pricing? How might it reduce competition, and why might it be difficult to tell when it should be illegal?
20. If public utilities are a natural monopoly, what would be the danger in deregulating them?
21. If public utilities are a natural monopoly, what would be the danger in splitting them up into a number of separate competing firms?
22. What is cost-plus regulation?
23. What is price cap regulation?
24. What is deregulation? Name some industries that have been deregulated in the United States.
25. What is regulatory capture?
26. Why does regulatory capture reduce the persuasiveness of the case that regulating industries benefits consumers?

Critical Thinking Questions

27. Does either the four-firm concentration ratio or the HHI directly measure the amount of competition in an industry? Why or why not?
28. What would be evidence of serious competition between firms in an industry? Can you identify two highly competitive industries?
29. Can you think of any examples of successful predatory pricing in the real world?
30. If you were developing a product (like a web browser) for a market with significant barriers to entry, how would you try to get your product into the market successfully?
31. In the middle of the twentieth century, major U.S. cities had multiple competing city bus companies. Today, there is usually only one, and it runs as a subsidized, regulated monopoly. What do you suppose caused the change?
32. Why are urban areas willing to subsidize urban transit systems? Does the argument for subsidies make sense to you?
33. Deregulation, like all changes in government policy, always has pluses and minuses. What do you think some of the minuses might be for airline deregulation?

34. Do you think it is possible for government to outlaw everything that businesses could do wrong? If so, why does government not do that? If not, how can regulation stay ahead of rogue businesses that push the limits of the system until it breaks?

Problems

35. Use the following table to calculate the four-firm concentration ratio for the U.S. car market. Does this indicate a concentrated market or not?

GM	19%
Ford	17%
Toyota	14%
Chrysler	11%

36. Use the previous and following table to calculate the Herfindal-Hirschman Index for the U.S. car market. Would the FTC approve a merger between GM and Ford?

Honda	10%
Nissan	7%
Hyundai	5%
Kia	4%
Subaru	3%
Volkswagen	3%

Use the table with data on a transit system to answer the following questions.

Quantity	Price	Marginal Revenue	Marginal Cost	Average Cost
1	10	10	9	9.0
2	9	8	6	7.5
3	8	6	5	6.7
4	7	4	3	5.8
5	6	2	2	5.0
6	5	0	3	4.7
7	4	–2	4	4.6
8	3	–4	5	4.6
9	2	–6	7	4.9
10	1	–8	10	5.4

37. If the transit system was allowed to operate as an unregulated monopoly, what output would it supply, and what price would it charge?

38. If the transit system was regulated to operate with no subsidy (i.e., at zero economic profit), what approximate output would it supply, and what approximate price would it charge?

39. If the transit system was regulated to provide the most allocatively efficient quantity of output, what output would it supply, and what price would it charge? What subsidy would be necessary to ensure this efficient provision of transit services?

Chapter 13 Exercises

Self-Check Questions

1. Classify the following situations as an example of a negative or positive externality:
   a. You are a birder (bird watcher); your neighbor has put up several birdhouses in the yard and planted trees and flowers that attract birds.
   b. Your neighbor paints his house a hideous color.
   c. Investments in private education raise your country's standard of living.
   d. Trash dumped upstream flows downstream, right past your home.
   e. Your roommate is a smoker, but you do not smoke.

2. Identify whether the market supply curve will shift right, shift left, or stay the same for the following scenarios:
   a. Firms in an industry are required to pay a fine for their emissions of carbon dioxide.
   b. Companies are sued for polluting the water in a river.
   c. Power plants in a specific city are not required to address the impact of their emissions on the quality of air.
   d. Companies that use fracking to remove oil and gas from rock are required to clean up the damage.

3. For each of your answers to the prior question, will equilibrium price rise, fall, or stay the same?

4. The supply and demand conditions for a manufacturing firm are given in the following table. The third column represents a supply curve without taking the social cost of pollution into account. The fourth column represents the supply curve when the firm is required to take the social cost of pollution into account. Identify the equilibrium before the social cost of production is included and after the social cost of production is included.

Price	Quantity Demanded	Quantity Supplied without Paying the Cost of Pollution	Quantity Supplied after Paying the Cost of Pollution
$10	450	400	250
$15	440	440	290
$20	430	480	330
$25	420	520	370
$30	410	560	410

5. Consider two approaches to reducing emissions of CO_2 into the environment from manufacturing industries in the United States. In the first approach, the U.S. government makes it a policy to use only predetermined technologies. In the second approach, the U.S. government determines which technologies are cleaner and subsidizes their use. Of the two approaches, which is the command-and-control policy?

6. Classify the following pollution-control policies as command-and-control or market-based.
   a. A state passes an emissions tax on the quantity of carbon emitted by each firm.
   b. The federal government requires domestic auto companies to improve car emissions by 2026.
   c. The EPA sets national standards for water quality.

d. A city sells permits to firms that allow them to emit a specified quantity of pollution.

e. The federal government pays fishermen to preserve salmon.

7. An emissions tax on a quantity of emissions from a firm is not a command-and-control approach to reducing pollution. Why?

8. Four firms called Elm, Maple, Oak, and Cherry produce wooden chairs. However, they also produce a great deal of garbage (a mixture of glue, varnish, sandpaper, and wood scraps). The first row in the following table shows the total amount of garbage (in tons) currently produced by each firm. The other rows of the table show the cost of reducing garbage produced by the first 5 tons, the second 5 tons, and so on. First, calculate the cost of requiring each firm to reduce the weight of its garbage by one-fourth. Now, imagine that marketable permits are issued for the current level of garbage, but the permits will shrink the weight of allowable garbage for each firm by one-fourth. What will be the result of this alternative approach to reducing pollution?

	Elm	Maple	Oak	Cherry
Current production of garbage (in tons)	20	40	60	80
Cost of reducing garbage by first 5 tons	$5,500	$6,300	$7,200	$3,000
Cost of reducing garbage by second 5 tons	$6,000	$7,200	$7,500	$4,000
Cost of reducing garbage by third 5 tons	$6,500	$8,100	$7,800	$5,000
Cost of reducing garbage by fourth 5 tons	$7,000	$9,000	$8,100	$6,000
Cost of reducing garbage by fifth 5 tons	$0	$9,900	$8,400	$7,000

9. The rows in the following table show three market-oriented tools for reducing pollution. The columns of the table show three complaints about command-and-control regulation. Fill in the table by stating briefly how each market-oriented tool addresses each of the three concerns.

	Incentives to Go Beyond	Flexibility about Where and How Pollution Will Be Reduced	Political Process Creates Loopholes and Exceptions
Pollution Charges			
Marketable Permits			
Property Rights			

10. Suppose a city releases 16 million gallons of raw sewage into a nearby lake. The following table shows the total costs of cleaning up the sewage to different levels, together with the total benefits of doing so. (Benefits are environmental, recreational, health, and industrial.)

Quantity of Sewage Released in Nearby Lake	Total Cost (in thousands of dollars)	Total Benefits (in thousands of dollars)
16 million gallons	Current situation	Current situation
12 million gallons	50	800
8 million gallons	150	1,300
4 million gallons	500	1,650
0 gallons	1,200	1,900

a. Use the information from the table to calculate the marginal costs and marginal benefits of reducing sewage emissions for this city. See Chapter 8 if you need a refresher on how to calculate marginal costs.

b. What is the optimal level of sewage for this city?

c. Why not just pass a law that zero sewage can be released in the lake? After all, the total benefits of zero emissions exceed the total costs.

11. The state of Colorado requires oil and gas companies who use fracking techniques to return the land to its original condition after the oil and gas extractions. The following table shows the total cost and total benefits (in dollars) of this policy.

Land Restored (in acres)	Total Cost	Total Benefit
0	$0	$0
200	$20	$140
300	$80	$240
400	$160	$320
500	$280	$380

a. Calculate the marginal cost and marginal benefit at each quantity (acre) of land restored. See Chapter 8 if you need a refresher on how to calculate marginal costs and benefits.

b. If we apply marginal analysis, what is the optimal amount of land to be restored?

12. Consider the case of global environmental problems that spill across international borders as a prisoner's dilemma of the sort studied in Chapter 11. Say that there are two countries, A and B. Each country can choose whether to protect the environment, at a cost of 10, or not to protect it, at a cost of zero. If one country decides to protect the environment, there is a benefit of 16, but the benefit is divided equally between the two countries. If both countries decide to protect the environment, there is a benefit of 32, which is divided equally between the two countries.

In the following table, fill in the costs, benefits, and total payoffs to the countries of the following decisions. Explain why, without some international agreement, they are likely to end up with neither country acting to protect the environment.

		Country B	
		Protect	Not Protect
Country A	Protect		
	Not Protect		

13. A country called Sherwood is covered with a forest of 50,000 trees. There are proposals to clear some of Sherwood's forest and grow corn, but obtaining this additional economic output will have an environmental cost from reducing the number of trees. The following table shows possible combinations of economic output and environmental protection.

Combo	Bushels of Corn (thousands)	Number of Trees (thousands)
P	9	5
Q	2	30
R	7	20
S	2	40
T	6	10

a. Sketch a graph of a production possibility frontier with environmental quality on the horizontal axis, measured by the number of trees, and the quantity of economic output, measured in corn, on the vertical axis.

b. Which choices display productive efficiency? How can you tell?

c. Which choices show allocative efficiency? How can you tell?

d. In the choice between *T* and *R*, decide which one is better. Why?

e. In the choice between *T* and *S*, can you say which one is better and why?

f. If you had to guess, which choice would you think is more likely to represent a command-and-control environmental policy, and which choice is more likely to represent a market-oriented environmental policy, *Q* or *S*? Why?

Review Questions

14. What is an externality?

15. Give an example of a positive externality and a negative externality.

16. What is the difference between private costs and social costs?

17. In a market without environmental regulations, will the supply curve for a firm take into account private costs, external costs, both, or neither? Explain.

18. What is command-and-control environmental regulation?

19. What are the three problems that economists have noted with regard to command-and-control regulation?

20. What is a pollution charge, and what incentive does it provide for a firm to take external costs into account?

21. What is a marketable permit, and what incentive does it provide for a firm to take external costs into account?

22. What are better-defined property rights, and what incentive do they provide to take external costs into account?

23. As the extent of environmental protection expands, would you expect marginal costs of environmental protection to rise or fall? Why or why not?

24. As the extent of environmental protection expands, would you expect the marginal benefits of environmental protection to rise or fall? Why or why not?

25. What are the economic tradeoffs between low-income and high-income countries in international conferences on global environmental damage?

26. What arguments do low-income countries make in international discussions of global environmental clean-up?

27. In the tradeoff between economic output and environmental protection, what do the combinations on the production possibility frontier represent?

28. What does a point inside the production possibility frontier represent?

Critical Thinking Questions

29. Suppose you want to put a dollar value on the external costs of carbon emissions from a power plant. What information or data would you obtain to measure the external (social) cost?

30. Would environmentalists favor command-and-control policies as a way to reduce pollution? Why or why not?

31. Consider two ways of protecting elephants from poachers in African countries. In one approach, the government sets up enormous national parks that have sufficient habitat for elephants to thrive and forbids all local people to enter the parks or injure either the elephants or their habitat in any way. In a second approach, the government sets up national parks and designates ten villages around the edges of the park that become places where tourists can stay and bases for guided tours inside the national park. Consider the different incentives of local villagers—who often are very poor—in each of these plans. Which plan seems more likely to help the elephant population?

32. Will a system of marketable permits work with thousands of firms? Why or why not?

33. Is zero pollution possible under a marketable permits system? Why or why not?

34. Is zero pollution an optimal goal? Why or why not?

35. From an economic perspective, is it sound policy to pursue a goal of zero pollution? Why or why not?

36. Recycling is a relatively inexpensive solution to much of the environmental contamination from plastics, glass, and other waste materials. Is it a sound policy to make it mandatory for everybody to recycle?

37. Can extreme levels of pollution hurt the economic development of a high-income country? Why or why not?

38. How can high-income countries benefit from covering much of the cost of reducing pollution created by low-income countries?

39. Technological innovations shift the production possibility curve. Examine the graph you sketched for Exercise 13a. Which types of technologies should a country promote? Should "clean" technologies be promoted over other technologies? Why or why not?

Problems

40. Show the market for cigarettes in equilibrium, assuming that there are no laws banning smoking in public. Label the equilibrium private market price and quantity as P_m and Q_m. Add whatever is needed to the model to show the impact of the negative externality from secondhand smoking. (*Hint*: in this case, it is the consumers, not the sellers, who are creating the negative externality.) Label the social optimal output and price as P_e and Q_e. On the graph, shade in the deadweight loss at the market output.

41. Refer to the following table. The externality created by the production of refrigerators was \$100. However, once both the private and additional external costs were taken into consideration, the market price increased by only \$50. If the external costs were \$100, why did the price only increase by \$50 when all costs were taken into account?

Price	Quantity Demanded	Quantity Supplied before Considering Pollution Cost	Quantity Supplied after Considering Pollution Cost
\$600	50,000	40,000	30,000
\$650	45,000	45,000	35,000
\$700	40,000	50,000	40,000
\$750	35,000	55,000	45,000
\$800	30,000	60,000	50,000
\$850	25,000	65,000	55,000
\$900	20,000	70,000	60,000

42. The following table shows the supply and demand conditions for a firm that will play trumpets on the streets when requested. Q_s^1 is the quantity supplied without social costs. Q_s^2 is the quantity supplied with social costs. What is the negative externality in this situation? Identify the equilibrium price and quantity when only private costs are taken into account, and then when social costs are taken into account. How does taking the externality into account affect the equilibrium price and quantity?

P	Q_d	Q_s^1	Q_s^2
\$20	0	10	8
\$18	1	9	7
\$15	2.5	7.5	5.5
\$12	4	6	4
\$10	5	5	3
\$5	7.5	2.5	0.5

43. In the Land of Purity, there is only one form of pollution, called "gunk." The following table shows possible combinations of economic output and reduction of gunk, depending on what kinds of environmental regulations are chosen.

Combo	Economic Output	Gunk Cleaned Up
J	800	10%
K	500	30%
L	600	40%
M	400	40%
N	100	90%

a. Sketch a graph of a production possibility frontier with environmental quality on the horizontal axis, measured by the percentage reduction of gunk, and quantity of economic output on the vertical axis.

b. Which choices display productive efficiency? How can you tell?

c. Which choices show allocative efficiency? How can you tell?

d. In the choice between *K* and *L*, can you say which one is better and why?

e. In the choice between *K* and *N*, can you say which one is better and why?

f. If you had to guess, which choice would you think is more likely to represent a command-and-control environmental policy and which is more likely to represent a market-oriented environmental policy, *L* or *M*? Why?

Chapter 14 Exercises

Self-Check Questions

1. Do market demand curves reflect positive externalities? Why or why not?

2. Suppose Sony's R&D investment in digital devices has increased profits by 20%. Is this a private or social benefit?

3. The Gizmo Company is looking at plans for developing many new household gadgets. The following table shows the company's demand for financial capital for R&D of these gadgets, based on expected rates of return from sales. However, say that every investment would have an additional 5% social benefit; that is, an investment that pays at least a 6% return to the Gizmo Company will pay at least an 11% return for society as a whole; an investment that pays at least 7% for the Gizmo Company will pay at least 12% for society as a whole, and so on. Answer the questions that follow based on this information.

Estimated Rate of Return	Private Profits of the Firm from an R&D Project (in millions)
10%	$100
9%	$102
8%	$108
7%	$118
6%	$133
5%	$153
4%	$183
3%	$223

   a. If the going interest rate is 9%, how much will Gizmo invest in R&D if it receives only the private benefits of this investment?

   b. Assume that the interest rate is still 9%. How much will the firm invest if it also receives the social benefits of its investment? (Add an additional 5% return on all levels of investment.)

4. The Junkbuyers Company travels from home to home, looking for opportunities to buy and resell or recycle items that would otherwise be put out with the garbage. Will the private or social benefits be larger?

5. When a neighborhood is cleaned up and kept neat, there are a number of positive spillovers: higher property values, less crime, and happier residents. What types of government policies can encourage neighborhoods to clean up?

6. Education provides both private benefits to those who receive it and broader social benefits for the economy as a whole. Think about the types of policies a government can follow to address the issue of positive spillovers in technology. Then, suggest a parallel set of policies that governments could follow for addressing positive externalities in education.

7. Which of the following goods or services are nonexcludable?

   a. police protection

   b. streaming music from satellite transmission programs

   c. roads

   d. primary education

   e. cell phone service

8. Are the following goods nonrival in consumption?

   a. slice of pizza

   b. laptop computer

   c. public radio

   d. ice cream cone

Review Questions

9. In what way do company investments in R&D create positive externalities?
10. Will the demand for borrowing and investing in R&D be higher or lower if there are no external benefits?
11. Why might private markets tend to provide too few incentives for the development of new technology?
12. What can government do to encourage the development of new technology?
13. What are the two key characteristics of public goods?
14. Name two public goods and explain why they are public goods.
15. What is the free rider problem?
16. Explain why the federal government funds national defense.

Critical Thinking Questions

17. Can a company be guaranteed all the social benefits of a new invention?
18. Is it inevitable that government must become involved in supporting investments in new technology?
19. How do public television stations, like PBS, try to overcome the free rider problem?
20. Why is a baseball game a quasi-public good on ESPN but a public good on NBC, CBS, or ABC?
21. Provide two examples of goods/services that are classified as private even though they are provided by the federal government.
22. Radio stations, tornado sirens, lighthouses, and street lights are all public goods because they are nonrival and nonexcludable. Therefore, why does the government provide tornado sirens, street lights, and lighthouses but not radio stations (other than PBS stations)?

Problems

23. HighFlyer Airlines wants to build new airplanes with greatly increased cabin space. This will allow the firm to increase the comfort of passengers and sell more tickets at a higher price. However, redesigning the cabin means rethinking many other elements of the airplane as well, like the placement of engines and luggage and the most efficient shape of the plane for moving through the air. HighFlyer Airlines has developed a list of possible methods to increase cabin space, along with estimates of how these approaches would affect costs of operating the plane and sales of airline tickets. Based on these estimates, the following table shows the value of R&D projects that provide at least a certain private rate of return.

Private Rate of Return	Value of R&D Projects that Return at Least the Private Rate of Return to HighFlyer Airlines
12%	$100
10%	$200
8%	$300
6%	$400
4%	$500

a. If the opportunity cost of financial capital for HighFlyer Airlines is 6%, how much should the firm invest in R&D?

b. Assume that the social rate of return for R&D is an additional 2% on top of the private return; that is, an R&D investment that had a 7% private return to HighFlyer Airlines would have a 9% social return. How much investment is socially optimal at the 6% interest rate?

24. Assume that the marginal private costs of a firm producing fuel-efficient cars is greater than the marginal social costs. Assume that the marginal private benefits of a firm producing fuel-efficient cars is the same as the marginal social benefits. Discuss one way the government can try to increase production and sales of fuel-efficient cars to the socially desirable amount. (*Hint*: the government is trying to affect production through costs, not benefits.)

25. Becky and Sarah are sisters who share a room. Their room can easily get messy, and their parents are always telling them to clean it up. If both Becky and Sarah clean, they each spend two hours and get a clean room. If Becky decides not to clean and Sarah does all the cleaning, Sarah spends ten hours cleaning, Becky spends zero, and Sarah is exhausted. The same would occur for Becky if Sarah decided not to clean: Becky spends ten hours and becomes exhausted. If both girls decide not to clean, they both have a dirty room.

a. What is the best outcome for Becky and Sarah? What is the worst outcome? (It would help you to construct a prisoner's dilemma table.)

b. Unfortunately, we know that the optimal outcome will most likely not happen and that the worst one will probably be chosen instead. Explain what about Becky's and Sarah's reasoning will lead them both to choose the worst outcome.

Chapter 15 Exercises

Self-Check Questions

1. The following table shows levels of employment (labor), the marginal product at each of those levels, and the price at which the firm can sell output in the perfectly competitive market where it operates.

Labor	Marginal Product of Labor	Price of the Product
1	10	$4
2	8	$4
3	7	$4
4	5	$4
5	3	$4
6	1	$4

   a. What is the value of the marginal product at each level of labor?

   b. If the firm operates in a perfectly competitive labor market where the going market wage is $12, what is the firm's profit-maximizing level of employment?

2. The following table shows levels of employment (labor), the marginal product at each of those levels, and a monopoly's marginal revenue.

Labor	Marginal Product of Labor	Marginal Revenue
1	10	$10
2	8	$7
3	7	$5
4	5	$4
5	3	$2
6	1	$1

   a. What is the monopoly's marginal revenue product at each level of employment?

   b. If the monopoly operates in a perfectly competitive labor market where the going market wage is $20, what is the firm's profit-maximizing level of employment?

3. The following table shows the quantity demanded and supplied in the labor market for driving city buses in the town of Unionville, where all the bus drivers belong to a union.

Wage per Hour	Quantity of Workers Demanded	Quantity of Workers Supplied
$14	12,000	6,000
$16	10,000	7,000
$18	8,000	8,000
$20	6,000	9,000
$22	4,000	10,000
$24	2,000	11,000

   a. What would the equilibrium wage and quantity be in this market if no union existed?

   b. Assume that the union has enough negotiating power to raise the wage to $4 per hour higher than it would otherwise be. Is there now excess demand or excess supply of labor?

4. Do unions typically oppose new technology out of a fear that it will reduce the number of union jobs? Why or why not?

5. Compared with the share of workers in most other high-income countries, is the share of U.S. workers whose wages are determined by union bargaining higher or lower? Why or why not?

6. Are firms with a high percentage of union employees more likely to go bankrupt because of the higher wages that they pay? Why or why not?

7. Do countries with a higher percentage of unionized workers usually have less growth in productivity because of strikes and other disruptions caused by the unions? Why or why not?

8. The following table shows information from the supply curve for labor for a monopsonist—that is, the wage rate required at each level of employment.

Labor	Wage
1	$10
2	$8
3	$7
4	$5
5	$3
6	$1

   a. What is the monopsonist's marginal cost of labor at each level of employment?

   b. What is the firm's profit-maximizing level of employment and wage?

9. Explain in each of the following situations how market forces might give a business an incentive to act in a less discriminatory fashion.

   a. A local flower delivery business run by a bigoted White owner notices that many of its local customers are Black.

   b. An assembly line has traditionally only hired men, but it is having a hard time hiring sufficiently qualified workers.

   c. A biased owner of a firm that provides home health care services would like to pay lower wages to Hispanic workers than other employees.

10. Does the earnings gap between the average wages of females and the average wages of males prove labor market discrimination? Why or why not?

11. If immigration is reduced, what is the impact on the wage for low-skilled labor?

Review Questions

12. What determines the demand for labor for a firm operating in a perfectly competitive output market?

13. What determines the demand for labor for a firm with market power in the output market?

14. What is a perfectly competitive labor market?

15. What is a labor union?

16. Why do employers have a natural advantage in bargaining with employees?

17. What are some of the most important laws that protect employee rights?

18. How does the presence of a labor union change negotiations between employers and workers?

19. What is the long-term trend in American union membership?

20. Would you expect the presence of labor unions to lead to higher or lower pay for members? Would you expect a higher or lower quantity of workers hired by those employers? Explain briefly.

21. What are the main causes for the recent trends in union membership rates in the United States? Why are union rates lower in the United States than in many other developed countries?

22. What is a monopsony?

23. What is the marginal cost of labor?

24. How does monopsony affect the equilibrium wage and employment levels?

25. What is a bilateral monopoly?

26. How does a bilateral monopoly affect the equilibrium wage and employment levels compared to a perfectly competitive labor market?

27. Describe how the earnings gap between men and women has evolved in recent decades.

28. Describe how the earnings gap between Black and White workers has evolved in recent decades.

29. Does a gap between the average earnings of men and women, or between White and Black workers, prove that employers are discriminating in the labor market? Explain briefly.

30. Will a free market tend to encourage or discourage discrimination? Explain briefly.

31. What policies, when used together with antidiscrimination laws, might help to reduce the earnings gap between men and women and between White and Black workers?

32. Describe how affirmative action is applied in the labor market.

33. What factors can explain the relatively small effect of low-skilled immigration on the wages of low-skilled workers?

34. Have levels of immigration to the United States been relatively high or low in recent years? Explain.

35. How would you expect immigration by primarily low-skill workers to affect American low-skilled workers?

Critical Thinking Questions

36. Are unions and technological improvements complementary? Why or why not?

37. Will union membership continue to decline? Why or why not?

38. If the United States allows a greater quantity of highly skilled immigrants, what will be the impact on the average wages of highly skilled employees?

39. If it is not profitable to discriminate, why does discrimination persist?

40. If a company has discriminated against minorities in the past, should it be required to give priority to minority applicants today? Why or why not?

41. What is the marginal cost of labor for a firm that operates in a competitive labor market? How does this compare with the marginal cost of labor for a monopsony?

42. Given the decline in union membership over the past fifty years, what does the theory of bilateral monopoly suggest will have happened to the equilibrium level of wages over time? Why?

43. If all countries eliminated all barriers to immigration, would global economic growth increase? Why or why not?

Chapter 16 Exercises

Self-Check Questions

1. Describe how each of the following changes is likely to affect poverty and inequality:
   a. Incomes rise for low-income and high-income workers but rise more for high-income earners.
   b. Incomes fall for low-income and high-income workers but fall more for high-income earners.
2. Jonathan is a single father with one child. He can work as a server for $6 per hour for up to 1,500 hours per year. He is eligible for welfare, so if he does not earn any income, he will receive a total of $10,000 per year. He can work and still receive government benefits, but for every $1 of income, his welfare stipend is $1 less. Create a table that shows Jonathan's options. Use four columns, the first showing number of hours to work, the second showing his earnings from work, the third showing the government benefits he will receive, and the fourth column showing his total income (earnings plus government support). Sketch a labor-leisure diagram of Jonathan's opportunity set with and without government support.
3. Imagine that the government reworks the welfare policy that was affecting Jonathan in the prior question, so that for each dollar someone like Jonathan earns at work, his government benefits diminish by only $0.30. Reconstruct the table from the prior question to account for this change in policy. Draw Jonathan's labor-leisure opportunity sets, both for before this welfare program is enacted and after it is enacted.
4. We've discovered that the welfare system discourages recipients from working because the more income they earn, the less welfare benefits they receive. How does the Earned Income Tax Credit (EITC) attempt to loosen the poverty trap?
5. How does TANF attempt to loosen the poverty trap?
6. A group of ten people have the following annual incomes: $24,000, $18,000, $50,000, $100,000, $12,000, $36,000, $80,000, $10,000, $24,000, $16,000. Calculate the share of total income received by each quintile of this income distribution. Do the top and bottom quintiles in this distribution have a greater or larger share of total income than the top and bottom quintiles of the U.S. income distribution?
7. The following table shows the share of income going to each quintile of the income distribution for the United Kingdom in 1979 and 1991. Use this data to calculate what the points on a Lorenz curve would be, and sketch the Lorenz curve. How did inequality in the United Kingdom shift over this time period? How can you see the patterns in the quintiles in the Lorenz curves?

Share of Income	1979	1991
Top quintile	39.7%	42.9%
Fourth quintile	24.8%	22.7%
Middle quintile	17.0%	16.3%
Second quintile	11.5%	11.5%
Bottom quintile	7.0%	6.6%

8. Using two demand and supply diagrams, one for the low-wage labor market and one for the high-wage labor market, explain how information technology can increase income inequality if it is a complement to high-income workers, like salespeople and managers, but a substitute for low-income workers, like file clerks and receptionists.

9. Again, using two demand and supply diagrams, one for the low-wage labor market and one for the high-wage labor market, explain how a program that increases educational levels for a substantial number of low-skill workers could reduce income inequality.

10. Consider this hypothesis: a well-funded social safety net can increase economic equality but will reduce economic output. Explain why this might be so, and sketch a production possibility curve that shows this tradeoff.

11. Consider this hypothesis: a well-funded social safety net may lead to less regulation of the market economy. Explain why this might be so, and sketch a production possibility curve that shows this tradeoff.

12. Which set of policies is more likely to cause a tradeoff between economic output and equality: policies of redistribution or policies aimed at the ladder of opportunity? Explain how the production possibility frontier tradeoff between economic equality and output might look in each case.

13. Why is there reluctance on the part of some in the United States to redistribute income so that greater equality can be achieved?

Review Questions

14. How is the poverty rate calculated?

15. What is the poverty line?

16. What is the difference between poverty and income inequality?

17. How does the poverty trap discourage people from working?

18. How can the effect of the poverty trap be reduced?

19. Who are the near-poor?

20. What is the safety net?

21. Briefly explain the differences between TANF, the EITC, SNAP, and Medicaid.

22. Who is included in the top income quintile?

23. What is measured on the two axes of a Lorenz curve?

24. If a country had perfect income equality, what would the Lorenz curve look like?

25. How has the inequality of income changed in the U.S. economy since the late 1970s?

26. What are some reasons why a certain degree of inequality of income would be expected in a market economy?

27. What are the main reasons economists give for the increase in inequality of incomes?

28. Identify some public policies that can reduce the level of economic inequality.

29. Describe how a push for economic equality might reduce incentives to work and produce output. Then, describe how a push for economic inequality might not have such effects.

Critical Thinking Questions

30. What goods and services would you include in an estimate of the basic necessities for a family of four?

31. If a family of four earned $22,000, would they be able to make ends meet given the official poverty threshold?

32. Exercises 2 and 3 asked you to describe the labor-leisure tradeoff for Jonathan. Since there is no monetary incentive for Jonathan to work, explain why he may choose to work anyway. Explain what the opportunity costs of working and not working might be for Jonathan. Using your tables and graphs from Exercises 2 and 3, analyze how the government welfare system affects Jonathan's incentive to work.

33. Explain how you would create a government program that would give an incentive for labor to increase hours and keep labor from falling into the poverty trap.

34. Many critics of government programs to help low-income individuals argue that these programs create a poverty trap. Explain how programs such as TANF, EITC, SNAP, and Medicaid will affect low-income individuals and whether or not you think these programs will benefit families and children.

35. Think about the business cycle: unemployment increases during a recession and decreases during an expansionary phase. Explain what happens to TANF, SNAP, and Medicaid programs at each phase of the business cycle (recession, trough, expansion, and peak).

36. Explain how a country may experience greater equality in the distribution of income yet still experience high rates of poverty. (*Hint*: review the Clear It Up titled "How do economists measure poverty in low-income countries?" and compare to Table 1 from Lesson 16.4.)

37. The demand for skilled workers in the United States has been increasing. To increase the supply of skilled workers, many argue that immigration reform to allow more skilled labor into the United States is needed. Explain whether you agree or disagree.

38. Explain a situation using the supply and demand for skilled labor, in which the increased number of college graduates leads to depressed wages. Given the rising cost of going to college, explain why or why not a college education will increase income inequality.

39. What do you think is more important to focus on when considering inequality: income inequality or wealth inequality?

40. To reduce income inequality, should the marginal tax rates on the top 1% be increased?

41. Redistribution of income occurs through the federal income tax and government antipoverty programs. Explain whether or not this level of redistribution is appropriate and whether more redistribution should occur.

42. How does a society or a country make the decision about the tradeoff between equality and economic output? (*Hint*: think about the political system.)

43. Explain what the long- and short-term consequences are of not promoting equality or working to reduce poverty.

Problems

44. In Country A, the population is 300 million, and 50 million people are living below the poverty line. What is the poverty rate?

45. In Country B, the population is 900 million, and 100 million people are living below the poverty line. What is the poverty rate?

46. Susan is a single mother with three children. She can earn $8 per hour and works up to 2,000 hours per year. However, if she does not earn any income at all, she will receive government benefits totaling $16,000 per year. For every $1 of income she earns, her level of government support will be reduced by $1. Create a table patterned after the one in Exercise 2. The first column should show Susan's choices of how many hours to work per year, up to 2,000 hours. The second column should show her earnings from work. The third column should show her level of government support, given her earnings. The final column should show her total income, combining earnings and government support.

47. A group of ten people have the following annual incomes: $55,000, $30,000, $15,000, $20,000, $35,000, $80,000, $40,000, $45,000, $30,000, $50,000. Calculate the share of total income received by each quintile of this income distribution. Do the top and bottom quintiles in this distribution have a greater or larger share of total income than the top and bottom quintiles of the U.S. income distribution for 2019?

Chapter 17 Exercises

Self-Check Questions

1. For each of the following purchases, indicate whether you would expect the degree of imperfect information to be relatively high or relatively low:
   - **a.** Buying apples at a roadside stand
   - **b.** Buying dinner at the neighborhood restaurant around the corner
   - **c.** Buying a used laptop computer at a garage sale
   - **d.** Ordering flowers over the internet for your friend in a different city
2. Why is there asymmetric information in the labor market? What signals can an employer look for that might indicate the traits they are seeking in a new employee?
3. Why is it difficult to measure health outcomes?

Review Questions

4. Why might it be difficult for a buyer and seller to agree on a price when imperfect information exists?
5. What do economists (and used-car dealers) mean by a "lemon"?
6. What are some ways a seller of goods might reassure a possible buyer who is faced with imperfect information?
7. What are ways a seller of labor (that is, someone looking for a job) might reassure a possible employer who is faced with imperfect information?
8. What are some ways that someone looking for a loan might reassure a bank that is faced with imperfect information about whether the loan will be repaid?
9. What is an insurance premium?
10. In an insurance system, would you expect each person to receive in benefits pretty much what they pay in premiums? Or is it just that the average benefits paid will equal the average premiums paid?
11. What is an actuarially fair insurance policy?
12. What is the problem of moral hazard?
13. How can moral hazard lead to insurance being more costly than was expected?
14. Define deductibles, copayments, and coinsurance.
15. How can deductibles, copayments, and coinsurance reduce moral hazard?
16. What is the key difference between a fee-for-service health care system and a system based on health maintenance organizations?
17. How might adverse selection make it difficult for an insurance market to operate?
18. What are some of the metrics used to measure health outcomes?

Critical Thinking Questions

19. You are on the board of directors of a private high school, which is hiring new tenth-grade science teachers. As you think about hiring someone for a job, what are some mechanisms you might use to overcome the problem of imperfect information?

20. A website offers a place for people to buy and sell emeralds, but information about emeralds can be quite imperfect. The website then enacts a rule that all sellers in the market must pay for two independent examinations of their emeralds, which are available to the customer for inspection.

- **a.** How would you expect this improved information to affect demand for emeralds on this website?
- **b.** How would you expect this improved information to affect the quantity of high-quality emeralds sold on the website?

21. How do you think the problem of moral hazard might have affected the safety of sports such as football and boxing when safety regulations started requiring that players wear more padding?

22. To what sorts of customers would an insurance company offer a policy with a high copay? What about a high premium with a lower copay?

Problems

23. Using the scenario in Exercise 20, sketch the effects in part (*a*) and (*b*) on a single supply and demand diagram. What prediction would you make about how the improved information alters the equilibrium quantity and price?

24. Imagine that fifty-year-old men can be divided into two groups: those who have a family history of cancer and those who do not. For the purposes of this example, say that 20% of a group of 1,000 men have a family history of cancer, and these men have a 1 in 50 chance of dying in the next year, while the other 80% of men have a 1 in 200 chance of dying in the next year. The insurance company is selling a policy that will pay $100,000 to the estate of anyone who dies in the next year.

- **a.** If the insurance company were selling life insurance separately to each group, what would be the actuarially fair premium for each group?
- **b.** If an insurance company were offering life insurance to the entire group, but could not find out about family cancer histories, what would be the actuarially fair premium for the group as a whole?
- **c.** What will happen to the insurance company if it tries to charge the actuarially fair premium to the group as a whole rather than to each group separately?

Chapter 18 Exercises

Self-Check Questions

1. Answer these three questions about early-stage corporate finance:
   a. Why do very small companies tend to raise money from private investors instead of through an IPO?
   b. Why do small, young companies often prefer an IPO to borrowing from a bank or issuing a bond as they grow?
   c. Who has better information about whether a small firm is likely to earn profits, a venture capitalist or a potential bondholder, and why?
2. From a firm's point of view, how is a bond similar to a bank loan? How are they different?
3. Calculate the equity each of these people has in their home:
   a. Fred just bought a house for $200,000 by giving 10% as a down payment and borrowing the rest from the bank.
   b. Freda bought a house for $150,000 in cash, but if she were to sell it now, it would sell for $250,000.
   c. Frank bought a house for $100,000. He put 20% down and borrowed the rest from the bank. However, the value of the house has now increased to $160,000 and he has paid off $20,000 of the bank loan.
4. Which has a higher average return over time: stocks, bonds, or a savings account? Explain your answer.
5. Investors sometimes fear that a high-risk investment is especially likely to have low returns. Is this fear true? Does high risk mean the return must be low?
6. What is the total amount of interest collected from a $5,000 loan after three years with a simple interest rate of 6%?
7. If you receive $500 in simple interest on a loan that you made for $10,000 for five years, what was the interest rate you charged?
8. You open a five-year CD for $1,000 that pays 2% interest compounded annually. What is the value of that CD at the end of the five years?

Review Questions

9. What are the most common ways for startup firms to raise financial capital?
10. Why can firms not just use their own profits for financial capital, with no need for outside investors?
11. Why are banks more willing to lend to well-established firms?
12. What is a bond?
13. What does a share of stock represent?
14. When do firms receive money from the sale of stock in their firm, and when do they not receive money?
15. What is a dividend?
16. What is a capital gain?
17. What's the difference between a private company and a public company?
18. How do the shareholders who own a company choose the actual managers of the company?
19. Why are banks called "financial intermediaries"?
20. Name several different kinds of bank accounts. How are they different?
21. Why are bonds somewhat risky to buy, even though they make predetermined payments based on a fixed rate of interest?
22. Why should a financial investor care about diversification?

23. What is a mutual fund?

24. What is an index fund?

25. How is buying a house to live in a type of financial investment?

26. Why is it hard to forecast future movements in stock prices?

27. What two key choices can U.S. citizens make to increase their relative wealth?

28. Is investing in housing always a very safe investment?

Critical Thinking Questions

29. If you owned a small firm that had become somewhat established, but you needed a surge of financial capital to carry out a major expansion, would you prefer to raise the funds through borrowing or by issuing stock? Explain why or why not.

30. Explain how a company can fail when the safeguards that should be in place fail.

31. What are some reasons why the investment strategy of a thirty-year-old might differ from the investment strategy of a sixty-five-year-old?

32. Explain why a financial investor in stocks can't earn high capital gains simply by buying companies with a demonstrated record of high profits.

33. Explain what happens in an economy when the financial markets limit access to capital. How does this affect economic growth and employment?

34. You and your friend have opened an account on E-Trade and have each decided to select five similar companies in which to invest. You are diligent in monitoring your selections, tracking prices, current events, and actions taken by the company. Your friend hangs out at the gym and doesn't seem to have a care in the world. Explain what might be the performance for each of your portfolios at the end of the year.

35. How do bank failures cause the economy to go into recession?

Problems

36. The Darkroom Windowshade Company has 100,000 shares of stock outstanding. The investors in the firm own the following numbers of shares: Investor 1 has 20,000 shares; Investor 2 has 18,000 shares; Investor 3 has 15,000 shares; Investor 4 has 10,000 shares; Investor 5 has 7,000 shares; and Investors 6–11 have 5,000 shares each. What is the minimum number of investors it would take to vote to change the top management of the company? If Investors 1 and 2 agree to vote together, can they be certain of always getting their way in how the company will be run?

37. Imagine that a $10,000 ten-year bond was issued at an interest rate of 6%. You are thinking about buying this bond one year before the end of the ten years, but interest rates are now 9%.

    a. Given the change in interest rates, would you expect to pay more or less than $10,000 for the bond?

    b. Calculate what you would actually be willing to pay for this bond.

38. Suppose Ford Motor Company issues a five-year bond with a face value of $5,000 that pays an annual coupon payment of $150.

    a. What is the interest rate that Ford is paying on the borrowed funds?

    b. Suppose the market interest rate rises from 3% to 4% a year after Ford issues the bonds. Will the value of the bond increase or decrease?

39. How much money do you have to put into a bank account that pays 10% interest compounded annually to have $10,000 in ten years?

40. Many retirement funds charge an administrative fee equal to 0.25% on managed assets. Suppose that Alex and Spencer each invest $5,000 in the same stock this year. Alex invests directly and earns 5% a year. Spencer uses a retirement fund and earns 4.75%. After thirty years, how much more will Alex have than Spencer?

Chapter 19 Exercises

Self-Check Questions

1. Based on the theory of rational ignorance, what should we expect to happen to voter turnout as the internet makes information easier to obtain?
2. What is the cost of voting in an election?
3. What is the main factor preventing a large community from influencing policy in the same way as a special interest group?
4. Why might legislators vote to impose a tariff on Egyptian cotton, when consumers in their districts would benefit from its availability?
5. True or false: majority rule can fail to produce a single preferred outcome when there are more than two choices. Explain your answer.
6. Anastasia, Emma, and Greta are deciding what to do on a weekend getaway. They each suggest a first choice and then vote on the options. Their first, second, and third preferences are shown in the following table. Explain why they will have a hard time reaching a decision. Does the group prefer mountain biking to canoeing? What about canoeing compared to the beach? What about the beach compared to the original choice of mountain biking?

	First Choice	Second Choice	Third Choice
Anastasia	Beach	Mountain biking	Canoeing
Emma	Mountain biking	Canoeing	Beach
Greta	Canoeing	Beach	Mountain biking

7. Suppose an election is being held for Soft Drink Commissioner. The field consists of one candidate from the Pepsi party and four from the Coca-Cola party. This would seem to indicate a strong preference for Coca-Cola among the voting population, but the Pepsi candidate ends up winning in a landslide. Why does this happen?

Review Questions

8. How does rational ignorance discourage voting?
9. How can a small special interest group win in a situation of majority voting when the benefits it seeks flow only to a small group?
10. How can pork-barrel spending occur in a situation of majority voting when it benefits only a small group?
11. Why do legislators vote for spending projects in districts that are not their own?
12. Why does a voting cycle make it impossible to decide on a majority-approved choice?
13. How does a government agency raise revenue differently from a private company, and how does that affect the way government decisions are made compared to business decisions?

Critical Thinking Questions

14. What are some reasons people might find it rational to acquire information about politics and vote, in contrast to the rational ignorance theory?

15. What are some possible ways to encourage voter participation and overcome rational ignorance?

16. Given that rational ignorance discourages some people from becoming informed about elections, is it necessarily a good idea to encourage greater voter turnout? Why or why not?

17. When Microsoft was founded, the company devoted very few resources to lobbying activities. After a high-profile antitrust case against it, however, the company began to lobby heavily. Why does it make financial sense for companies to invest in lobbyists?

18. Representatives of competing firms often comprise special interest groups. Why are competitors sometimes willing to cooperate in order to form lobbying associations?

19. Special interests do not oppose regulations in all cases. The Marketplace Fairness Act of 2013 would require online merchants to collect sales taxes from their customers in other states. Why might a large online retailer like Amazon support such a measure?

20. To ensure safety and efficacy, the Food and Drug Administration regulates the medicines that are allowed to be sold in the United States. Sometimes, this means a drug must be tested for years before it is allowed to reach the market. The winners in this system are easily identifiable as those who are protected from unsafe drugs that might otherwise harm them. Who are the more anonymous losers who suffer from strict medical regulations?

21. How is it possible to bear a cost without realizing it? What are some examples of policies that affect people in ways they may not even be aware of?

22. Is pork-barrel spending always a bad thing? Can you think of some examples of pork-barrel projects, perhaps from your own district, that have had positive results?

23. The United States currently uses a voting system called "first past the post" (FPTP) in elections, meaning that the candidate with the most votes wins. What are some of the problems with an FPTP system?

24. What are some alternatives to an FPTP system that might reduce the problem of voting cycles?

25. AT&T spent around $10 million dollars lobbying Congress to block entry of competitors into the telephone market in 1978. Why do you think its efforts failed?

26. Occupy Wall Street was a national (and later global) organized protest against the greed, bank profits, and financial corruption that led to the 2008–2009 recession. The group popularized slogans like, "We are the 99%," meaning it represented the majority against the wealth of the top 1%. Does the fact that the protests had little to no effect on legislative changes support or contradict this chapter?

Problems

27. Say that the government is considering a ban on smoking in restaurants in Tobaccoville. There are 1 million people living there, and each would benefit by \$200 from this smoking ban. However, there are two large tobacco companies in Tobaccoville, and the ban would cost them \$5 million each. What are the total costs and benefits of this proposed policy? Do you think it will be passed?

Chapter 20 Exercises

Self-Check Questions

1. True or false: the source of comparative advantage must be natural elements, like climate and mineral deposits. Explain.
2. Brazil can produce 100 pounds of beef or 10 cars; in contrast, the United States can produce 40 pounds of beef or 30 cars. Which country has the absolute advantage in beef? Which country has the absolute advantage in cars? What is the opportunity cost of producing 1 pound of beef in Brazil? What is the opportunity cost of producing 1 pound of beef in the United States?
3. In France, it takes 1 worker to produce 1 sweater and 1 worker to produce 1 bottle of wine. In Tunisia, it takes 2 workers to produce 1 sweater and 3 workers to produce 1 bottle of wine. Who has the absolute advantage in production of sweaters? Who has the absolute advantage in production of wine? How can you tell?
4. In Germany, it takes 3 workers to make 1 television and 4 workers to make 1 video camera. In Poland, it takes 6 workers to make 1 television and 12 workers to make 1 video camera.
   a. Who has the absolute advantage in the production of televisions? Who has the absolute advantage in the production of video cameras? How can you tell?
   b. Calculate the opportunity cost of producing one additional television set in Germany and in Poland. (Your calculation may involve fractions, which is fine.) Which country has a comparative advantage in the production of televisions?
   c. Calculate the opportunity cost of producing 1 video camera in Germany and in Poland. Which country has a comparative advantage in the production of video cameras?
   d. In this example, is absolute advantage the same as comparative advantage, or not?
   e. In what product should Germany specialize? In what product should Poland specialize?
5. How can there be any economic gains for a country from both importing and exporting the same good, like cars?

6. The following table shows how the average costs of production for semiconductors (the chips in computer memories) change as the quantity of semiconductors built at that factory increases.

Quantity of Semiconductors	Average Total Cost
10,000	$8 each
20,000	$5 each
30,000	$3 each
40,000	$2 each
100,000	$2 each

a. Based on these data, sketch a curve with quantity produced on the horizontal axis and average cost of production on the vertical axis. How does the curve illustrate economies of scale?

b. If the equilibrium quantity of semiconductors demanded is 90,000, can this economy take full advantage of economies of scale? What about if quantity demanded is 70,000 semiconductors, 50,000 semiconductors, or 30,000 semiconductors?

c. Explain how international trade could make it possible for even a small economy to take full advantage of economies of scale while also benefiting from competition and the variety offered by several producers.

7. If the removal of trade barriers is so beneficial to international economic growth, why would a nation continue to restrict trade on some imported or exported products?

Review Questions

8. What is absolute advantage? What is comparative advantage?

9. Under what conditions does comparative advantage lead to gains from trade?

10. What factors did Paul Krugman identify that supported the expansion of international trade in the 1800s?

11. Is it possible to have a comparative advantage in the production of a good but not to have an absolute advantage? Explain.

12. How does comparative advantage lead to gains from trade?

13. What is intra-industry trade?

14. What are the two main sources of economic gains from intra-industry trade?

15. What is splitting up the value chain?

16. Are the gains from international trade more likely to be relatively more important to large or small countries?

Critical Thinking Questions

17. Are differences in geography behind the differences in absolute advantages?

18. Why does the United States not have an absolute advantage in coffee?

19. Return to Exercise 2. Compute the opportunity costs of producing sweaters and wine in both France and Tunisia. Who has the lowest opportunity cost of producing sweaters, and who has the lowest opportunity cost of producing wine? Explain what it means to have a lower opportunity cost.

20. Suppose you just overheard your friend say, "Poor countries like Malawi have no absolute advantages. They have poor soil, low investments in formal education and hence low-skill workers, no capital, and no natural resources to speak of. Because they have no advantage, they cannot benefit from trade." How would you respond?

21. Consider the following table. Is there a range of trades for which there will be no gains?

Country	Current Shoe Production	Current Refrigerator Production
United States	5,000	20,000
Mexico	4,000	5,000
Total	9,000	25,000

22. You just got a job in Washington, D.C. You move into an apartment with some acquaintances. None of your roommates clean up after themselves. You, on the other hand, can clean faster than each of them. You determine that you are 70% faster at dishes and 10% faster at vacuuming. Both tasks have to be done daily. Which jobs should you assign to your roommates to get the most free time overall? Assume you have the same number of hours to devote to cleaning. Now, since you are faster, you seem to get done quicker than your roommate. What sorts of problems may this create? Can you imagine a trade-related analogy for this problem?

23. Does intra-industry trade contradict the theory of comparative advantage?

24. Do consumers benefit from intra-industry trade?

25. Why might intra-industry trade seem surprising from the point of view of comparative advantage?

26. In World Trade Organization meetings, what do you think low-income countries lobby for?

27. Why might a low-income country put up barriers to trade, such as tariffs on imports?

28. Can a nation's comparative advantage change over time? What factors would make it change?

Problems

29. France and Tunisia both have Mediterranean climates that are excellent for producing and harvesting green beans and tomatoes. In France, it takes 2 hours for each worker to harvest green beans and 2 hours to harvest a tomato. Tunisian workers only need 1 hour to harvest the tomatoes but 4 hours to harvest green beans. Assume there are only 2 workers, and each worker works 40 hours a week.

a. Draw a production possibilities frontier for each country. (*Hint:* remember, the production possibility frontier is the maximum that all workers can produce in a unit of time which, in this problem, is a week.)

b. Identify which country has the absolute advantage in green beans and which has the absolute advantage in tomatoes.

c. Identify which country has the comparative advantage.

d. How much would France have to give up in terms of tomatoes to gain from trade? How much would it have to give up in terms of green beans?

30. In Japan, 1 worker can make 5 tons of rubber or 80 radios. In Malaysia, 1 worker can make 10 tons of rubber or 40 radios.

a. Who has the absolute advantage in the production of rubber or radios? How can you tell?

b. Calculate the opportunity cost of producing 80 additional radios in Japan and in Malaysia. Which country has a comparative advantage in the production of radios?

c. Calculate the opportunity cost of producing 10 additional tons of rubber in Japan and in Malaysia. Which country has a comparative advantage in producing rubber?

d. In this example, does each country have an absolute advantage and a comparative advantage in the same good, or not?

e. In what product should Japan specialize? In what product should Malaysia specialize?

31. The following table describes how many barrels of oil and tons of lumber can be produced by workers in Canada and Venezuela.

Country	Oil (barrels)	Lumber (tons)
Canada	20	40
Venezuela	60	30

a. Draw a production possibilities frontier for each country. Assume there are 100 workers in each country. Canadians and Venezuelans desire both oil and lumber. Canadians want at least 2,000 tons of lumber. Mark a point on their production possibilities where they can get at least 3,000 tons.

b. Assume that the Canadians specialize completely because they figured out they have a comparative advantage in lumber. They are willing to give up 1,000 tons of lumber. How much oil should they ask for in return for lumber to be as well off as they were with no trade? How much should they ask for if they want to gain from trading with Venezuela? (*Note*: we can think of this ask as the relative price or trade price of lumber.)

c. Is the Canadian ask you identified in (b) also beneficial for Venezuelans? Use the production possibilities frontier graph for Venezuela to show that Venezuelans can gain from trade.

d. Is there an ask where Venezuelans may say "no, thank you" to trading with Canada?

32. From earlier chapters you will recall that technological change shifts the average cost curves. Draw a graph showing how technological change could influence intra-industry trade.

33. Consider two countries: South Korea and Taiwan. Taiwan can produce 1 million mobile phones per day at a cost of $10 per phone, and South Korea can produce 50 million mobile phones per day at a cost of $5 per phone. Assume these phones are the same type and quality and there is only one price. What is the minimum price at which both countries will engage in trade?

34. If trade increases world GDP by 1% per year, what is the global impact of this increase over ten years? How does this increase compare to the annual GDP of a country like Sri Lanka? (*Hint*: to answer this question, here are steps you may want to consider. Go to the World Development Indicators [online] published by the World Bank. Find the current level of world GDP in constant international dollars. Also, find the GDP of Sri Lanka in constant international dollars. Once you have these two numbers, compute the increase in global GDP due to trade and compare that number to Sri Lanka's GDP.)

Chapter 21 Exercises

Self-Check Questions

1. Explain how a tariff reduction causes an increase in the equilibrium quantity of imports and a decrease in the equilibrium price.
2. Explain how a subsidy on sugar adversely affects the income of foreign producers of imported sugar.
3. Explain how trade barriers save jobs in protected industries, but only by costing jobs in other industries.
4. Explain how trade barriers raise wages in protected industries by reducing average wages economy-wide.
5. How does international trade affect working conditions of low-income countries?
6. Do the jobs for workers in low-income countries that involve making products for export to high-income countries typically pay those workers more or less than their next-best alternative?
7. How do trade barriers affect the average income level in an economy?
8. How does the cost of saving jobs in protected industries compare to the workers' wages and salaries?
9. Explain how predatory pricing could be a motivation for dumping.
10. Why do low-income countries like Brazil, Egypt, or Vietnam have lower environmental standards than high-income countries like Germany, Japan, or the United States?
11. Explain the logic behind the race-to-the-bottom argument and the likely reason it has not occurred.
12. What are the conditions under which a country may use the unsafe products argument to block imports?
13. Why is the national security argument not convincing?
14. Assume there's a perfectly competitive market and a small exporting country. Using a demand and supply diagram, show the impact of increasing standards on a low-income exporter of toys. Show the impact of a tariff. Is the effect on the price of toys the same or different? Why is a standards policy preferred to tariffs?
15. What is the difference between a free trade association, a common market, and an economic union?
16. Why would countries promote protectionist laws while also negotiating for freer trade internationally?
17. What might account for the dramatic increase in international trade over the past fifty years?
18. How does competition, whether domestic or foreign, harm businesses?
19. What are the gains from competition?

Review Questions

20. Who does protectionism protect? What does it protect them from?

21. Name and define three policy tools for enacting protectionism.

22. How does protectionism affect the price of the protected good in the domestic market?

23. Does international trade, taken as a whole, increase the total number of jobs, decrease the total number of jobs, or leave the total number of jobs about the same?

24. Is international trade likely to have roughly the same effect on the number of jobs in each individual industry?

25. How is international trade, taken as a whole, likely to affect the average level of wages?

26. Is international trade likely to have about the same effect on everyone's wages?

27. What are the main reasons for protecting infant industries? Why is it difficult to stop protecting them?

28. What is dumping? Why does prohibiting it often work better in theory than in practice?

29. What is the race-to-the-bottom scenario?

30. Do the rules of international trade require that all nations impose the same consumer safety standards?

31. What is the national interest argument for protectionism with regard to certain products?

32. Name several of the international treaties where countries negotiate with each other over trade policy.

33. What is the general trend of trade barriers over recent decades: higher, lower, or about the same?

34. If opening up to free trade would benefit a nation, why do nations not just eliminate their trade barriers and not bother with international trade negotiations?

35. Who gains and who loses from trade?

36. Why is trade a good thing if some people lose?

37. What are some ways that governments can help people who lose from trade?

Critical Thinking Questions

38. Show graphically that for any tariff, there is an equivalent quota that would give the same result. What would be the difference, then, between the two types of trade barriers? (*Hint*: it is not something you can see from the graph.)

39. From the Work It Out in Lesson 21.1, you can see that a tariff raises the price of imports. Interestingly, the price rises by less than the amount of the tariff. Who pays the rest of the tariff amount? Can you show this graphically?

40. If trade barriers hurt the average worker in an economy (due to lower wages), why does the government create trade barriers?

41. Why do you think labor standards and working conditions are lower in the low-income countries of the world than in countries like the United States?

42. How would direct subsidies to key industries be preferable to tariffs or quotas?

43. How can governments identify good candidates for infant industry protection? Can you suggest some key characteristics of good candidates? Why are industries like computers not good candidates for infant industry protection?

44. Microeconomic theory argues that it is economically rational (and profitable) to sell additional output as long as the price covers the variable costs of production. How is this relevant to determining if dumping has occurred?

45. How do you think Americans would feel if other countries began to urge the United States to increase environmental standards?

46. Is it legitimate to impose higher safety standards on imported goods than exist in the foreign country where the goods were produced?

47. Why might the unsafe consumer products argument be a more effective strategy (from the perspective of the importing country) than using tariffs or quotas to restrict imports?

48. Why might a tax on domestic consumption of resources critical for national security be a more efficient approach than barriers to imports?

49. Why do you think the GATT rounds and WTO negotiations have become longer and more difficult to resolve?

50. An economic union requires giving up some political autonomy to succeed. What are some examples of political power that countries must give up to be members of an economic union?

51. What are some examples of innovative products that have disrupted their industries for the better?

52. In principle, the benefits of international trade to a country exceed the costs, regardless of whether the country is importing or exporting. In practice, it is not always possible to compensate the losers in a country, such as, workers who lose their jobs due to foreign imports. In your opinion, does that mean trade should be inhibited to prevent the losses?

53. Economists sometimes say that protectionism is the second-best choice for dealing with any particular problem. What they mean is that there is often a policy choice that is more direct or effective at dealing with the problem—a choice that would still allow the benefits of trade to occur. Explain why protectionism is a second-best choice for the following:

a. Helping workers as a group

b. Helping industries stay strong

c. Protecting the environment

d. Advancing national defense

54. Trade has income distribution effects. For example, suppose that because of a government-negotiated reduction in trade barriers, trade between Germany and the Czech Republic increases. Germany sells house paint to the Czech Republic. The Czech Republic sells alarm clocks to Germany. Would you expect this pattern of trade to increase or decrease jobs and wages in the paint and alarm clock industries in each country? Sketch a demand and supply diagram for each of these four labor markets to illustrate your answer. What has to happen for there to be no increase in total unemployment in both countries?

Problems

55. Assume two countries, Thailand (T) and Japan (J), have one good: cameras. The demand (d) and supply (s) for cameras in Thailand and Japan are described by the following functions:

$$Q_d^T = 60 - P$$
$$Q_s^T = -5 + \frac{1}{4}P$$
$$Q_d^J = 80 - P$$
$$Q_s^J = -10 + \frac{1}{2}P$$

P is the price measured in a common currency used in both countries, such as the Thai baht.

a. Compute the equilibrium price (P) and quantities (Q) in each country without trade.

b. Now assume that free trade occurs. The free-trade price goes to 56.36 baht. Who exports and imports cameras and in what quantities?

56. You have just been put in charge of trade policy for Malawi. Coffee is a recent crop that is growing well, and the Malawian export market is developing. As such, Malawi coffee is an infant industry. Malawi coffee producers come to you and ask for tariff protection from cheap Tanzanian coffee. What sorts of policies will you enact? Explain.

57. The country of Pepperland exports steel to the Land of Submarines. Information for the quantity demanded (Q_d) and quantity supplied (Q_s) in each country, in a world without trade, are given in the following tables.

Pepperland

Price	Q_d	Q_s
$60	230	180
$70	200	200
$80	170	220
$90	150	240
$100	140	250

Land of Submarines

Price	Q_d	Q_s
$60	430	310
$70	420	330
$80	410	360
$90	400	400
$100	390	440

a. What would be the equilibrium price and quantity in each country in a world without trade? How can you tell?

b. What would be the equilibrium price and quantity in each country if trade is allowed to occur? How can you tell?

c. Sketch two supply and demand diagrams, one for each country, in the situation before trade.

d. On those diagrams, show the equilibrium price and the levels of exports and imports in the world after trade.

e. If the Land of Submarines imposes an antidumping import quota of 30, explain in general terms whether it will benefit or injure consumers and producers in each country.

f. Does your general answer change if the Land of Submarines imposes an import quota of 70?