so the increase is 3 pizzas, the average quantity is 11.5 pizzas an hour, and the quantity increases by 26 percent. The elasticity of supply is equal to 26 percent divided by 40 percent, which equals 0.65.

In Fig. 4.7(b), when the price rises from $20 to $21, the price rise is $1 and the average price is $20.50, so the price rises by 4.9 percent of the average price. The quantity increases from 10 to 20 pizzas an hour, so the increase is 10 pizzas, the average quantity is 15 pizzas, and the quantity increases by 67 percent. The elasticity of supply is equal to 67 percent divided by 4.9 percent, which equals 13.67.

Figure 4.8 shows the range of elasticities of supply. If the quantity supplied is fixed regardless of the price, the supply curve is vertical and the elasticity of supply is zero. Supply is perfectly inelastic. This case is shown in Fig. 4.8(a). A special intermediate case occurs when the percentage change in price equals the percentage change in quantity. Supply is then unit elastic. This case is shown in Fig. 4.8(b). No matter how steep the supply curve is, if it is linear and passes through the origin, supply is unit elastic. If there is a price at which sellers are willing to offer any quantity for sale, the supply curve is horizontal and the elasticity of supply is infinite. Supply is perfectly elastic. This case is shown in Fig. 4.8(c).

The Factors That Influence the Elasticity of Supply

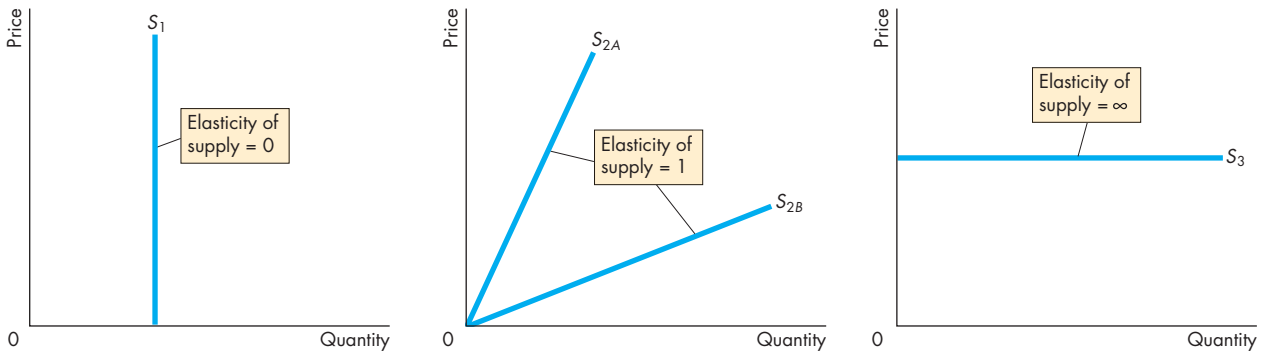
The elasticity of supply of a good depends on

- Resource substitution possibilities
- Time frame for the supply decision

Resource Substitution Possibilities Some goods and services can be produced only by using unique or rare productive resources. These items have a low, perhaps even a zero, elasticity of supply. Other goods and services can be produced by using commonly available resources that could be allocated to a wide variety of alternative tasks. Such items have a high elasticity of supply.

A Van Gogh painting is an example of a good with a vertical supply curve and a zero elasticity of supply. At the other extreme, wheat can be grown on land that is almost equally good for growing corn, so it is just as easy to grow wheat as corn. The opportunity cost of wheat in terms of forgone corn is almost constant. As a result, the supply curve of wheat is almost horizontal and its elasticity of supply is very large. Similarly, when a good is produced in many different countries (for example, sugar and beef), the supply of the good is highly elastic.

FIGURE 4.8 Inelastic and Elastic Supply



(a) Perfectly inelastic supply **(b) Unit elastic supply** **(c) Perfectly elastic supply**

Each supply illustrated here has a constant elasticity. The supply curve in part (a) illustrates the supply of a good that has a zero elasticity of supply. The supply curve in part (b) illustrates the supply of a good with a unit elasticity of supply. All linear supply curves that pass through the origin illustrate supplies that are unit elastic. The supply curve in part (c) illustrates the supply of a good with an infinite elasticity of supply.

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The supply of most goods and services lies between these two extremes. The quantity produced can be increased but only by incurring a higher cost. If a higher price is offered, the quantity supplied increases. Such goods and services have an elasticity of supply between zero and infinity.

Time Frame for the Supply Decision To study the influence of the amount of time elapsed since a price change, we distinguish three time frames of supply:

- Momentary supply
- Short-run supply
- Long-run supply

Momentary Supply When the price of a good changes, the immediate response of the quantity supplied is determined by the *momentary supply* of that good.

Some goods, such as fruits and vegetables, have a perfectly inelastic momentary supply—a vertical supply curve. The quantities supplied depend on crop-planting decisions made earlier. In the case of oranges, for example, planting decisions have to be made many years in advance of the crop being available. Momentary supply is perfectly inelastic because, on a given day, no matter what the price of oranges, producers cannot change their output. They have picked, packed, and shipped their crop to market, and the quantity available for that day is fixed.

In contrast, some goods have a perfectly elastic momentary supply. Long-distance phone calls are an example. When many people simultaneously make a call, there is a big surge in the demand for telephone cables, computer switching, and satellite time. The quantity supplied increases, but the price remains constant. Long-distance carriers monitor fluctuations in demand and reroute calls to ensure that the quantity supplied equals the quantity demanded without changing the price.

Short-Run Supply The response of the quantity supplied to a price change when only *some* of the possible adjustments to production can be made is determined by *short-run supply*. Most goods have an inelastic short-run supply. To increase output in the short run, firms must work their labor force overtime and perhaps hire additional workers. To decrease their output in the short run, firms either lay off workers or reduce their hours of work. With the passage of time, firms can make more adjustments, perhaps training additional workers or buying additional tools and other equipment.

For the orange grower, if the price of oranges falls, some pickers can be laid off and oranges left on the trees to rot. Or if the price of oranges rises, the grower can use more fertilizer and improved irrigation to increase the yields of their existing trees.

But an orange grower can't change the number of trees producing oranges in the short run.

Long-Run Supply The response of the quantity supplied to a price change after *all* the technologically possible ways of adjusting supply have been exploited is determined by *long-run supply*. For most goods and services, long-run supply is elastic and perhaps perfectly elastic.

For the orange grower, the long run is the time it takes new tree plantings to grow to full maturity—about 15 years. In some cases, the long-run adjustment occurs only after a completely new production plant has been built and workers have been trained to operate it—typically a process that might take several years.

REVIEW QUIZ

1. Why do we need a units-free measure of the responsiveness of the quantity supplied of a good or service to a change in its price?
2. Define the elasticity of supply and show how it is calculated.
3. What are the main influences on the elasticity of supply that make the supply of some goods elastic and the supply of other goods inelastic?
4. Provide examples of goods or services whose elasticities of supply are (a) zero, (b) greater than zero but less than infinity, and (c) infinity.
5. How does the time frame over which a supply decision is made influence the elasticity of supply? Explain your answer.

You can work these questions in Study Plan 4.3 and get instant feedback.

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You have now learned about the elasticities of demand and supply. Table 4.1 summarizes all the elasticities that you've met in this chapter. In the next chapter, we study the efficiency of competitive markets. But first study *Reading Between the Lines* on pp. 98–99, which puts the elasticity of demand to work and looks at the market for winter tomatoes.

TABLE 4.1 A Compact Glossary of Elasticities

Price Elasticities of Demand

A relationship is described as	When its magnitude is	Which means that
Perfectly elastic	Infinity	The smallest possible increase in price causes an infinitely large decrease in the quantity demanded*
Elastic	Less than infinity	The percentage decrease in the quantity demanded exceeds the percentage increase in price
Unit elastic	1	The percentage decrease in the quantity demanded equals the percentage increase in price
Inelastic	Less than 1 but greater than zero	The percentage decrease in the quantity demanded is less than the percentage increase in price
Perfectly inelastic	Zero	The quantity demanded is the same at all prices

Cross Elasticities of Demand

A relationship is described as	When its value is	Which means that
Close substitutes	Large	The smallest possible increase in the price of one good causes an infinitely large increase in the quantity demanded of the other good
Substitutes	Positive	If the price of one good increases, the quantity demanded of the other good also increases
Unrelated goods	Zero	If the price of one good increases, the quantity demanded of the other good remains the same
Complements	Negative	If the price of one good increases, the quantity demanded of the other good decreases

Income Elasticities of Demand

A relationship is described as	When its value is	Which means that
Income elastic (normal good)	Greater than 1	The percentage increase in the quantity demanded is greater than the percentage increase in income
Income inelastic (normal good)	Less than 1 but greater than zero	The percentage increase in the quantity demanded is greater than zero but less than the percentage increase in income
Negative (inferior good)	Less than zero	When income increases, quantity demanded decreases

Elasticities of Supply

A relationship is described as	When its magnitude is	Which means that
Perfectly elastic	Infinity	The smallest possible increase in price causes an infinitely large increase in the quantity supplied
Elastic	Less than infinity but greater than 1	The percentage increase in the quantity supplied exceeds the percentage increase in the price
Unit elastic	1	The percentage increase in the quantity supplied equals the percentage increase in the price
Inelastic	Greater than zero but less than 1	The percentage increase in the quantity supplied is less than the percentage increase in the price
Perfectly inelastic	Zero	The quantity supplied is the same at all prices

*In each description, the directions of change may be reversed. For example, in this case, the smallest possible *decrease* in price causes an infinitely large *increase* in the quantity demanded.

The Elasticities of Demand and Supply for Tomatoes

Frigid Florida Winter Is Bad News for Tomato Lovers

USA Today
March 5, 2010

ST. PETERSBURG, Fla. - A frigid Florida winter is taking its toll on your sandwich. The Sunshine State is the main U.S. source for fresh winter tomatoes, and its growers lost some 70 percent of their crop during January's prolonged cold snap. …

The average wholesale price for a 25-pound box of tomatoes is now $30, up from $6.50 a year ago. Florida's growers would normally ship about 25 million pounds of tomatoes a week; right now, they're shipping less than a quarter of that, according to Reggie Brown of the Florida Tomato Grower's Exchange, a tomato farmer cooperative in Maitland. …

And because high demand has driven up domestic prices, many wholesalers are buying from Mexico instead.

"We're obviously losing market share to Mexico, and there's always a price to pay to get the customer to get back into the Florida market," Brown said.

Florida is the only place where tomatoes are grown on a large scale in the United States during winter. California doesn't grow them until later in the year, and much of that state's crop is used for processed foods, such as ketchup, sauce, and juice. Other states grow tomatoes in greenhouses year-round, but Florida's winter tomato crop is by far the largest. …

Some Wendy's restaurants posted signs saying tomatoes would only be provided upon request because of limited availability. …

ESSENCE OF THE STORY

- Florida is the main U.S. source for fresh winter tomatoes.
- California tomatoes come to market later in the year and are mainly used for ketchup, sauce, and juice.
- Other states grow tomatoes in greenhouses year-round.
- In January 2010, a prolonged cold snap wiped out 70 percent of the Florida crop.
- The average wholesale price for a 25-pound box of tomatoes rose from $6.50 in January 2009 to $30 in January 2010.
- The quantity of tomatoes shipped decreased from a normal 25 million pounds per week to less than a quarter of that quantity.
- "High demand has driven up prices" and wholesalers are buying from Mexico.
- Some restaurants provided tomatoes only on request.

ECONOMIC ANALYSIS

- Using the information provided in this news article supplemented with an independent estimate of the price elasticity of demand, we can find the demand and supply curves in the market for winter tomatoes shown in Fig. 1.
- According to J. Scott Shonkwiler and Robert D. Emerson, two agricultural economists at the University of Florida, the price elasticity of demand for winter tomatoes is 0.8.
- A 1 percent rise in the price of these tomatoes brings a 0.8 percent decrease in the quantity demanded, other things remaining the same.
- According to the news article, in a normal period, the price of Florida winter tomatoes is $6.50 a box (25 pounds) and growers normally ship 25 million pounds a week.
- With the information just stated, we can determine the demand for winter tomatoes. It is the curve *D* in Figs. 1 and 2. This demand curve passes through the point that shows that 25 million pounds are demanded at a price of $6.50 a box. The elasticity of demand for winter tomatoes is 0.8.
- Figure 2 shows the calculation that confirms the price elasticity of demand is 0.8. When the price rises from $6.50 to $30 a box, as it did in January 2010, the quantity demanded decreases from 25 million to 8 million pounds. Use the numbers and the midpoint formula to confirm that the elasticity of demand is 0.8.
- Figures 1 and 3 show the supply of winter tomatoes. The news article says that Florida growers (the main producers of winter tomatoes) shipped less than a quarter of their normal 25 million pounds a week. So assume that they shipped 6 million pounds a week.
- Other growers (using greenhouses or in Mexico) make up the difference between what the Florida growers supply and the quantity demanded.
- The supply curve in normal times, S_0, must pass through the equilibrium point 25 million pounds and $6.50 a box.
- The supply curve in January 2010, S_1, must pass through the equilibrium point at that time of 8 million pounds and $30 a box. It also passes through the point 6 million pounds and $6.50 a box because that is the quantity that Florida growers would ship even if the price remained at $6.50 a box.
- We can calculate the elasticity of supply by using the numbers in Fig. 3 and the midpoint formula. The elasticity of supply is 0.22, which means that supply is inelastic.

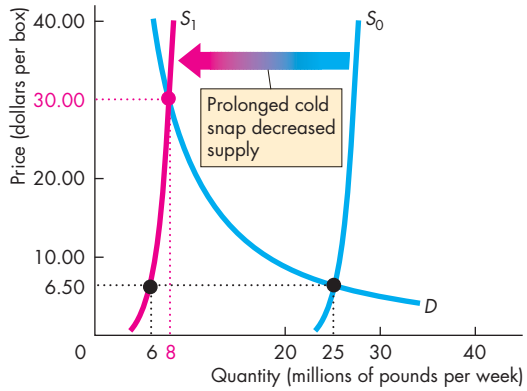


Figure 1 The market for winter tomatoes

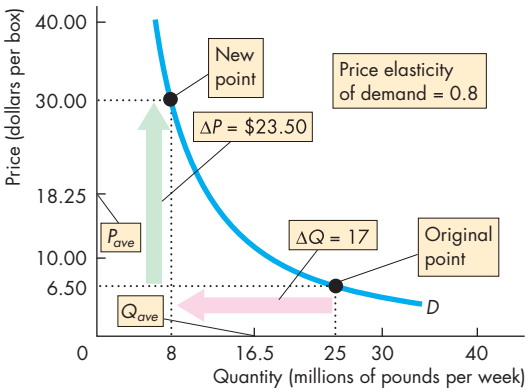


Figure 2 Price elasticity of demand for winter tomatoes

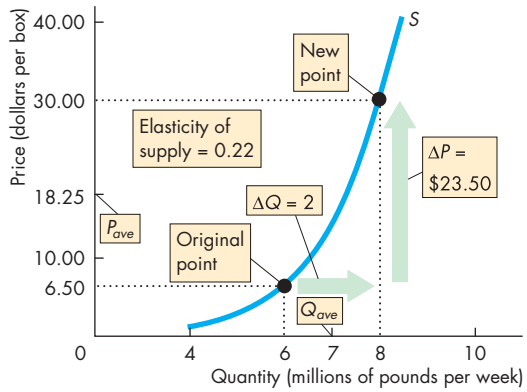


Figure 3 Price elasticity of supply of winter tomatoes

SUMMARY

Key Points

Price Elasticity of Demand (pp. 84–90)

- Elasticity is a measure of the responsiveness of the quantity demanded of a good to a change in its price, other things remaining the same.
- Price elasticity of demand equals the percentage change in the quantity demanded divided by the percentage change in the price.
- The larger the magnitude of the price elasticity of demand, the greater is the responsiveness of the quantity demanded to a given price change.
- If demand is elastic, a cut in price leads to an increase in total revenue. If demand is unit elastic, a cut in price leaves total revenue unchanged. And if demand is inelastic, a cut in price leads to a decrease in total revenue.
- Price elasticity of demand depends on how easily one good serves as a substitute for another, the proportion of income spent on the good, and the length of time elapsed since the price change.

Working Problems 1 to 8 will give you a better understanding of the price elasticity of demand.

More Elasticities of Demand (pp. 91–93)

- Cross elasticity of demand measures the responsiveness of the demand for one good to a change in the price of a substitute or a complement, other things remaining the same.
- The cross elasticity of demand with respect to the price of a substitute is positive. The cross elasticity of demand with respect to the price of a complement is negative.
- Income elasticity of demand measures the responsiveness of demand to a change in income, other things remaining the same. For a normal good, the income elasticity of demand is positive. For an inferior good, the income elasticity of demand is negative.
- When the income elasticity of demand is greater than 1 (income elastic), the percentage of income spent on the good increases as income increases.
- When the income elasticity of demand is less than 1 (income inelastic and inferior), the percentage of income spent on the good decreases as income increases.

Working Problems 9 to16 will give you a better understanding of cross and income elasticities of demand.

Elasticity of Supply (pp. 94–96)

- Elasticity of supply measures the responsiveness of the quantity supplied of a good to a change in its price, other things remaining the same.
- The elasticity of supply is usually positive and ranges between zero (vertical supply curve) and infinity (horizontal supply curve).
- Supply decisions have three time frames: momentary, short run, and long run.
- Momentary supply refers to the response of the quantity supplied to a price change at the instant that the price changes.
- Short-run supply refers to the response of the quantity supplied to a price change after some of the technologically feasible adjustments in production have been made.
- Long-run supply refers to the response of the quantity supplied to a price change when all the technologically feasible adjustments in production have been made.

Working Problems 17 and 18 will give you a better understanding of the elasticity of supply.

Key Terms

Cross elasticity of demand, 91
Elastic demand, 87
Elasticity of supply, 94
Income elasticity of demand, 92
Inelastic demand, 86
Perfectly elastic demand, 87
Perfectly inelastic demand, 86
Price elasticity of demand, 84
Total revenue, 88
Total revenue test, 88
Unit elastic demand, 86

STUDY PLAN PROBLEMS AND APPLICATIONS

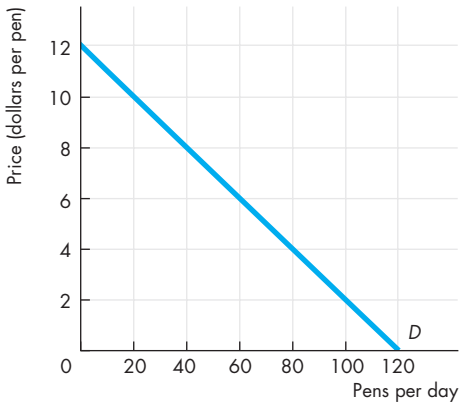
myeconlab You can work Problems 1 to 18 in MyEconLab Chapter 4 Study Plan and get instant feedback.

Price Elasticity of Demand (Study Plan 4.1)

1. Rain spoils the strawberry crop, the price rises from $4 to $6 a box, and the quantity demanded decreases from 1,000 to 600 boxes a week.
   a. Calculate the price elasticity of demand over this price range.
   b. Describe the demand for strawberries.
2. If the quantity of dental services demanded increases by 10 percent when the price of dental services falls by 10 percent, is the demand for dental services inelastic, elastic, or unit elastic?
3. The demand schedule for hotel rooms is

Price (dollars per night)	Quantity demanded (millions of rooms per night)
200	100
250	80
400	50
500	40
800	25

   a. What happens to total revenue when the price falls from $400 to $250 a night and from $250 to $200 a night?
   b. Is the demand for hotel rooms elastic, inelastic, or unit elastic?
4. The figure shows the demand for pens.



   Calculate the elasticity of demand when the price rises from $4 to $6 a pen. Over what price range is the demand for pens elastic?
5. In 2003, when music downloading first took off, Universal Music slashed the average price of a CD from $21 to $15. The company expected the price cut to boost the quantity of CDs sold by 30 percent, other things remaining the same.
   a. What was Universal Music's estimate of the price elasticity of demand for CDs?
   b. If you were making the pricing decision at Universal Music, what would be your pricing decision? Explain your decision.
6. The demand for illegal drugs is inelastic. Much of the expenditure on illegal drugs comes from crime. Assuming these statements to be correct,
   a. How will a successful campaign that decreases the supply of drugs influence the price of illegal drugs and the amount spent on them?
   b. What will happen to the amount of crime?
   c. What is the most effective way of decreasing the quantity of illegal drugs bought and decreasing the amount of drug-related crime?
7. **The Grip of Gas**

   U.S. drivers are ranked as the least sensitive to changes in the price of gasoline. For example, if the price rose from $3 to $4 per gallon and stayed there for a year U.S. purchases of gasoline would fall only about 5 percent.

   Source: *Slate*, September 27, 2005

   a. Calculate the price elasticity of demand for gasoline. Is the demand for gasoline elastic, unit elastic, or inelastic?
   b. Explain how the price rise from $3 to $4 a gallon changes the total revenue from gasoline sales.
8. **Spam Sales Rise as Food Costs Soar**

   Sales of Spam are rising as consumers realize that Spam and other lower-cost foods can be substituted for costlier cuts of meat as a way of controlling their already stretched food budgets.

   Source: *AOL Money & Finance*, May 28, 2008

   a. Is Spam a normal good or inferior good? Explain.
   b. Would the income elasticity of demand for Spam be negative or positive? Explain.

More Elasticities of Demand (Study Plan 4.2)

9. If a 12 percent rise in the price of orange juice decreases the quantity of orange juice demanded by 22 percent and increases the quantity of apple juice demanded by 14 percent, calculate the
   a. Price elasticity of demand for orange juice.
   b. Cross elasticity of demand for apple juice with respect to the price of orange juice.

10. When Judy's income increased from $130 to $170 a week, she increased her demand for concert tickets by 15 percent and decreased her demand for bus rides by 10 percent. Calculate Judy's income elasticity of demand for (a) concert tickets and (b) bus rides.
11. If a 5 percent rise in the price of sushi increases the quantity of soy sauce demanded by 2 percent and decreases the quantity of sushi demanded by 1 percent, calculate the
    a. Price elasticity of demand for sushi.
    b. Cross elasticity of demand for soy sauce with respect to the price of sushi.
12. **Swelling Textbook Costs Have College Students Saying "Pass"**

    Textbook prices have doubled and risen faster than average prices for the past two decades. Sixty percent of students do not buy textbooks. Some students hunt for used copies and sell them back at the end of the semester; some buy online, which is often cheaper than the campus store; some use the library copy and wait till it's free; some share the book with a classmate.

    Source: *Washington Post*, January 23, 2006

    Explain what this news clip implies about
    a. The price elasticity of demand for college textbooks.
    b. The income elasticity of demand for college textbooks.
    c. The cross elasticity of demand for college textbooks from the campus bookstore with respect to the online price of a textbook.

Use the following information to work Problems 13 to 15.

As Gas Costs Soar, Buyers Flock to Small Cars

Faced with high gas prices, Americans are substituting smaller cars for SUVs. In April 2008, Toyota Yaris sales increased 46 percent and Ford Focus sales increased 32 percent from a year earlier. Sales of SUVs decreased by more than 25 percent in 2008 and Chevrolet Tahoe sales fell 35 percent. Full-size pickup sales decreased more than 15 percent in 2008 and Ford F-Series pickup sales decreased by 27 percent in April 2008. The effect of a downsized vehicle fleet on fuel consumption is unknown. In California, gasoline consumption decreased by 4 percent in January 2008 from a year earlier. The price of gasoline in January 2008 increased by about 30 percent from a year earlier.

Source: *The New York Times*, May 2, 2009

13. Calculate the price elasticity of demand for gasoline in California.
14. Calculate the cross elasticity of demand for
    a. Toyota Yaris with respect to the price of gasoline.
    b. Ford Focus with respect to the price of gasoline.
15. Calculate the cross elasticity of demand for
    a. Chevrolet Tahoe with respect to the price of gasoline.
    b. A full-size pickup with respect to the price of gasoline.
16. **Home Depot Earnings Hammered**

    As gas and food prices increased and home prices slumped, people had less extra income to spend on home improvements. And the improvements that they made were on small inexpensive types of repairs and not major big-ticket items.

    Source: CNN, May 20, 2008

    a. What does this news clip imply about the income elasticity of demand for big-ticket home-improvement items?
    b. Would the income elasticity of demand be greater or less than 1? Explain.

Elasticity of Supply (Study Plan 4.3)

17. The table sets out the supply schedule of jeans.

Price (dollars per pair)	Quantity supplied (millions of pairs per year)
120	24
125	28
130	32
135	36

    Calculate the elasticity of supply when
    a. The price rises from $125 to $135 a pair.
    b. The average price is $125 a pair.
18. **Study Ranks Honolulu Third Highest for "Unaffordable Housing"**

    A study ranks Honolulu number 3 in the world for the most unaffordable housing market in urban locations, behind Los Angeles and San Diego and is deemed "severely unaffordable." With significant constraints on the supply of land for residential development, housing inflation has resulted.

    Source: *Hawaii Reporter*, September 11, 2007

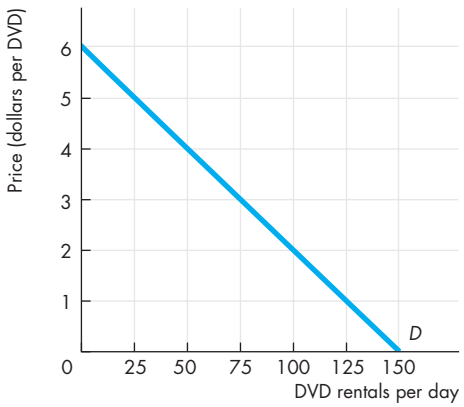
    a. Would the supply of housing in Honolulu be elastic or inelastic?
    b. Explain how the elasticity of supply plays an important role in influencing how rapidly housing prices in Honolulu rise.

ADDITIONAL PROBLEMS AND APPLICATIONS

myeconlab You can work these problems in MyEconLab if assigned by your instructor.

Price Elasticity of Demand

19. With higher fuel costs, airlines raised their average fare from 75¢ to $1.25 per passenger mile and the number of passenger miles decreased from 2.5 million a day to 1.5 million a day.
    a. What is the price elasticity of demand for air travel over this price range?
    b. Describe the demand for air travel.
20. The figure shows the demand for DVD rentals.



    a. Calculate the elasticity of demand when the price of a DVD rental rises from $3 to $5.
    b. At what price is the elasticity of demand for DVD rentals equal to 1?

Use the following table to work Problems 21 to 23.

The demand schedule for computer chips is

Price (dollars per chip)	Quantity demanded (millions of chips per year)
200	50
250	45
300	40
350	35
400	30

21. a. What happens to total revenue if the price falls from $400 to $350 a chip and from $350 to $300 a chip?
    b. At what price is total revenue at a maximum?
22. At an average price of $350, is the demand for chips elastic, inelastic, or unit elastic? Use the total revenue test to answer this question.
23. At $250 a chip, is the demand for chips elastic or inelastic? Use the total revenue test to answer this question.
24. Your price elasticity of demand for bananas is 4. If the price of bananas rises by 5 percent, what is
    a. The percentage change in the quantity of bananas you buy?
    b. The change in your expenditure on bananas?
25. **As Gasoline Prices Soar, Americans Slowly Adapt**

    As gas prices rose in March 2008, Americans drove 11 billion fewer miles than in March 2007. Realizing that prices are not going down, Americans are adapting to higher energy costs. Americans spend 3.7 percent of their disposable income on transportation fuels. How much we spend on gasoline depends on the choices we make: what car we drive, where we live, how much time we spend driving, and where we choose to go. For many people, higher energy costs mean fewer restaurant meals, deferred weekend outings with the kids, less air travel, and more time closer to home.

    Source: *International Herald Tribune*, May 23, 2008

    a. List and explain the elasticities of demand that are implicitly referred to in the news clip.
    b. Why, according to the news clip, is the demand for gasoline inelastic?

More Elasticities of Demand

Use this information to work Problems 26 and 27.

Economy Forces Many to Shorten Summer Vacation Plans

This year Americans are taking fewer exotic holidays by air and instead are visiting local scenic places by car. The global financial crisis has encouraged many Americans to cut their holiday budgets.

Source: *USA Today*, May 22, 2009

26. Given the prices of the two holidays, is the income elasticity of demand for exotic holidays positive or negative? Are exotic holidays a normal good or an inferior good? Are local holidays a normal good or an inferior good?
27. Are exotic holidays and local holidays substitutes? Explain your answer.
28. When Alex's income was $3,000, he bought 4 bagels and 12 donuts a month. Now his income is $5,000 and he buys 8 bagels and 6 donuts a month.

Calculate Alex's income elasticity of demand for
a. Bagels.
b. Donuts.

29. **Wal-Mart's Recession-Time Pet Project**
During the recession, Wal-Mart moved its pet food and supplies to in front of its other fast-growing business, baby products. Retail experts point out that kids and pets tend to be fairly recession-resistant businesses—even in a recession, dogs will be fed and kids will get their toys.
Source: CNN, May 13, 2008
a. What does this news clip imply about the income elasticity of demand for pet food and baby products?
b. Would the income elasticity of demand be greater or less than 1? Explain.

30. If a 5 percent fall in the price of chocolate sauce increases the quantity of chocolate sauce demanded by 10 percent and increases the quantity of ice cream demanded by 15 percent, calculate the
a. Price elasticity of demand for chocolate sauce.
b. Cross elasticity of demand for ice cream with respect to the price of chocolate sauce.

31. **Netflix to Offer Online Movie Viewing**
Online movie rental service Netflix has introduced a new feature to allow customers to watch movies and television series on their personal computers. Netflix competes with video rental retailer Blockbuster, which added an online rental service to the in-store rental service.
Source: CNN, January 16, 2007
a. How will online movie viewing influence the price elasticity of demand for in-store movie rentals?
b. Would the cross elasticity of demand for online movies and in-store movie rentals be negative or positive? Explain.
c. Would the cross elasticity of demand for online movies with respect to high-speed Internet service be negative or positive? Explain.

32. **To Love, Honor, and Save Money**
In a survey of caterers and event planners, nearly half of them said that they were seeing declines in wedding spending in response to the economic slowdown; 12% even reported wedding cancellations because of financial concerns.
Source: *Time*, June 2, 2008
a. Based upon this news clip, are wedding events a normal good or inferior good? Explain.
b. Are wedding events more a necessity or a luxury? Would the income elasticity of demand be greater than 1, less than 1, or equal to 1? Explain.

Elasticity of Supply

33. The supply schedule of long-distance phone calls is

Price (cents per minute)	Quantity supplied (millions of minutes per day)
10	200
20	400
30	600
40	800

Calculate the elasticity of supply when
a. The price falls from 40¢ to 30¢ a minute.
b. The average price is 20¢ a minute.

34. **Weak Coal Prices Hit China's Third-Largest Coal Miner**
The chairman of Yanzhou Coal Mining reported that the recession had decreased the demand for coal, with its sales falling by 11.9 percent to 7.92 million tons from 8.99 million tons a year earlier, despite a 10.6 percent cut in the price.
Source: Dow Jones, April 27, 2009
Calculate the price elasticity of supply of coal. Is the supply of coal elastic or inelastic?

Economics in the News

35. After you have studied *Reading Between the Lines* on pp. 98–99 answer the following questions.
a. Which demand is more price elastic and why: tomatoes in general or Florida winter tomatoes?
b. When cold weather destroyed the Florida crop and more tomatoes came from Mexico and greenhouses, what happened to the supply of tomatoes and the quantity of tomatoes supplied?
c. The news article says the "High demand has driven up prices and wholesalers are buying from Mexico." What does this statement mean? Did demand increase? Did it decrease? Is the news article correct?
d. Reggie Brown says "We're obviously losing market share to Mexico, and there's always a price to pay to get the customer to get back into the Florida market." What does he mean and what does that imply about the elasticity of demand for Florida tomatoes when the price rises and when the price falls?