

## Chapter 4

# ELASTICITY

*Microeconomics in Context* (Goodwin, et al.), 4<sup>th</sup> Edition

### Chapter Overview

This chapter continues dealing with the demand and supply curves we learned about in Chapter 3. You will learn about the notion of *elasticity* of demand and supply, the way in which demand is affected by income, and how a price change has both income and substitution effects on the quantity demanded.

### Objectives

After reading and reviewing this chapter, you should be able to:

1. Define elasticity of demand and differentiate between elastic and inelastic demand.
2. Calculate the elasticity of demand.
3. Understand how to apply an elasticity of demand to a business seeking to maximize revenues as well as to a policy situation.
4. Define elasticity of supply and differentiate between elastic and inelastic supply.
5. Understand the income and substitution effects of a price change.
6. Discuss the differences between short-run and long-run elasticities.

### Key Terms

elasticity  
price-inelastic demand  
price-inelastic demand (technical definition)

perfectly inelastic demand  
unit-elastic demand  
income elasticity of demand  
inferior goods  
income effect of a price change  
long-run elasticity

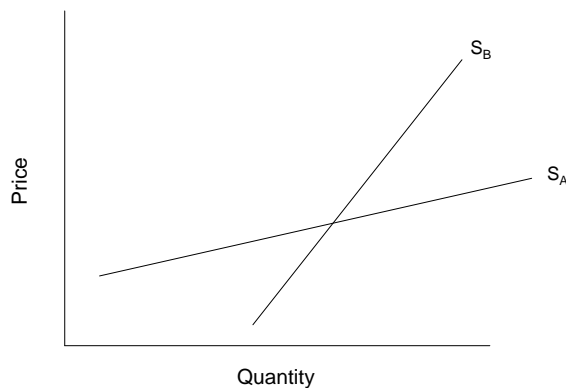
price elasticity of demand  
price-elastic demand  
price-elastic demand (technical definition)  
perfectly elastic demand  
price elasticity of supply  
normal goods  
substitution effect of a price change  
short-run elasticity

## Active Review Questions

*Fill in the blank*

1. When you drop by the only coffee shop in your neighborhood, you notice that the price of a cup of coffee has increased considerably since last week. You decide it's not a big deal, since coffee isn't a big part of your overall budget, and you buy a cup of coffee anyway. Most of the other coffee drinkers who frequent the coffee shop make a similar calculation. Thus, the demand for coffee in your neighborhood is relatively \_\_\_\_\_.
2. You sell muffins for one dollar each. If you raise your price by even one penny, you will lose all your customers. The demand curve for your muffins is thus \_\_\_\_\_.
3. The responsiveness of demand to income is known as the \_\_\_\_\_ of demand.
4. The income elasticity of demand is \_\_\_\_\_ for inferior goods and \_\_\_\_\_ for normal goods.
5. When demand is \_\_\_\_\_, revenue to the seller is unaffected by a price change.

**For Question #6, refer to the following graph:**



6. For a given price range, which of the supply curves in the graph shown above is characterized by a relatively greater elasticity of supply? \_\_\_\_\_
7. The elasticity of demand is calculated as the percent change in \_\_\_\_\_ divided by the percent change in \_\_\_\_\_.
8. When quantity demanded does not respond at all to price, demand is perfectly \_\_\_\_\_.

9. If the price elasticity of demand is greater than one, then demand is \_\_\_\_\_.
10. Suppose tangerines are an inferior good. This means that if your income decreases, you will buy (more/fewer) \_\_\_\_\_ tangerines.

*True or False*

11. Perfectly elastic demand refers to a situation in which any price change for the good in question, no matter how small, will produce an "infinite" change in quantity demanded.
12. When the seller increases the price charged for a good with an elastic demand, the seller's revenues will go up.
13. Elasticity is the same as the slope of the demand curve.
14. Income elasticity of demand is always expressed as a positive number (absolute value).
15. When the income elasticity of demand is positive but less than 1, demand is called "income elastic."
16. If a good is inferior and its price rises, the income effect will encourage greater expenditures, at the same time as the substitution effect pushes toward lower expenditures.

*Short Answer*

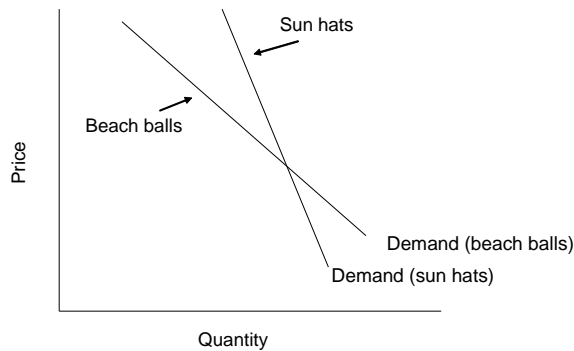
17. Name the three main reasons why demand for a good or service might be inelastic.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
18. You run the only lemonade stand in Central Park. If people don't buy lemonade from you, their only other option is to buy orange juice from a nearby vendor. One day, you decide to raise the price of your lemonade from \$1 per glass to \$1.25 per glass. As a result, half of your usual customers decide to get orange juice instead of lemonade that day. What does this experience tell you about the demand for lemonade in Central Park?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

19. A 20% increase in the price of milk leads to a 10% reduction in the quantity of milk demand. What is the price elasticity of demand for milk?

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**For Question #20, refer to the graph below.**



20. The graph shown above illustrates the demand curves for two goods: Sun hats and beach balls. Which demand curve is relatively more elastic?

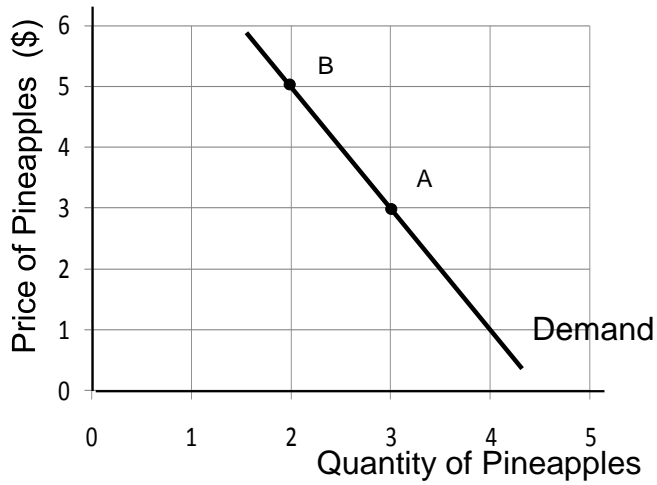
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### Problems

1. Draw a diagram of a perfectly inelastic demand curve. Suggest an example of a good for which demand might be perfectly elastic.
  
  
  
  
  
  
  
  
  
  
2. A limited number of Civil War uniforms have been preserved. No matter how much buyers are willing to pay for these uniforms as collectors items, there's no way to increase the quantity of uniforms in existence. Show the supply curve for authentic Civil War uniforms.

For Problems #3 and #4, refer to the following graph:



3. The graph above shows the demand curve for pineapples.

a. Calculate the amount of revenue the seller would receive if the price is set at \$3.

b. Calculate the amount of revenue the seller would receive if the price is set at \$5.

c. Reasoning from the results you just calculated, is the demand for bananas elastic or inelastic, in this range of prices? How do you know?

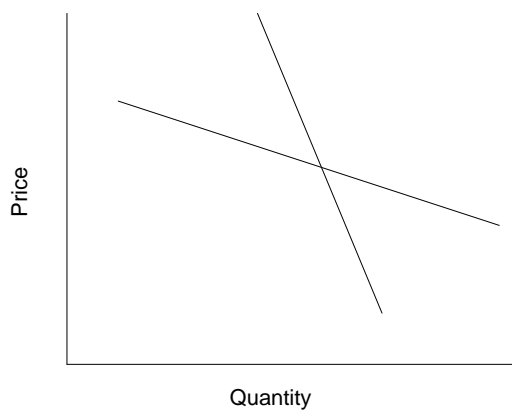
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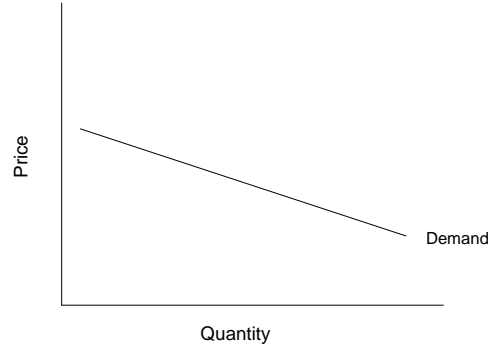
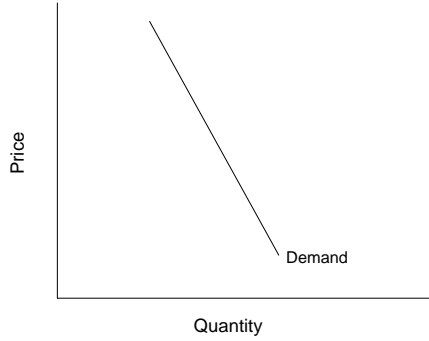
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4. Continuing with the above example of pineapples,
- Calculate the percent change in price that occurs in moving from point A (the “base” case) to point B, using the midpoint formula.
  - Calculate the percent change in quantity that occurs in moving from point A to point B, using the midpoint formula.
  - Calculate the price elasticity of demand for pineapples.
5. Suppose the demand for oranges is more price elastic in the demand for chocolate. On the graph below, indicate which line represents the demand for oranges, and which represents the demand for chocolate.



6. Which of the following demand curves is more elastic?

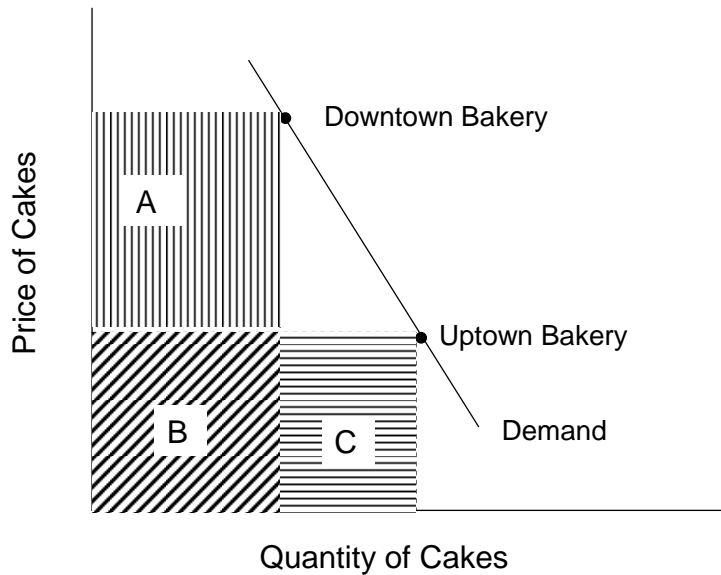


**Self Test**

1. The price of milk doubles, but the quantity demanded changes very little. Which of the following would *not* be a likely explanation for this phenomenon?

- a. There isn't a good substitute for milk.
- b. People feel they need milk, rather than just wanting it.
- c. Demand for milk is highly price elastic.
- d. Milk is not a very big part of most people's budget.
- e. All of the above are likely explanations for this phenomenon.

Questions 2 and 3 refer to the following scenario and graph. Bob's Bakery has two locations. The bakery decides to experiment with charging different prices at the two bakeries, to find out which price will bring in higher total revenues. The results of the experiment are shown in the graph below.



2. The revenue earned at Downtown Bakery is equal to
- area A
  - area B
  - area C
  - area A + B
  - area B + C
3. Area A is bigger than area C. This means that
- Demand for chocolate cake is highly price elastic.
  - Demand for chocolate cake is price inelastic.
  - The quantity demanded of chocolate cake exceeds the quantity supplied.
  - The quantity supplied of chocolate cake exceeds the quantity demanded.
  - None of the above.
4. Suppose a study finds that as people's incomes rise, they tend to buy fewer subway tokens because they are more likely to have a car. This would mean that subway tokens are
- normal goods
  - inferior goods
  - price elastic goods
  - price taker goods
  - supply elastic goods
5. The more money people make, the more pairs of shoes they buy. We can conclude that
- Shoes are a normal good.
  - Shoes are an inferior good.
  - Demand for shoes is highly price elastic.
  - Demand for shoes has an elasticity between 0 and 1.
  - All of the above.

Questions #6 and #7 refer to the following scenario: A 4% increase in the price of tomatoes leads to a 1% reduction in the quantity of tomatoes demanded.

6. The price elasticity of demand for tomatoes is:
- 0.5
  - 0.6
  - 0.25
  - 1.25
  - 4.0



7. Which of the following statements about the market in tomatoes is *false*?
- Demand for tomatoes is price inelastic.
  - A price increase will lead to a revenue increase.
  - Demand for tomatoes is unit elastic.
  - Price elasticity of demand equals percent change in quantity demanded, divided by percent change in price.
  - All of the above are true.
8. Which of the following statements is *true*?
- Elasticity is identical to the slope of the demand curve.
  - A single, straight-line demand curve can be elastic in one region and inelastic in another.
  - Perfectly inelastic demand can be represented by a horizontal line.
  - When demand is unit elastic, revenue is strongly affected by price changes.
  - You can always determine the relative elasticity of demand for two products by comparing the slope of their demand curves.
9. Suppose a 50% increase in the price of a drug results in no change in the quantity demanded. What is the price elasticity of the drug?
- 0
  - 0.05
  - 0.5
  - 1
  - Infinite
10. Suppose the price elasticity of demand for a good is -0.6. When the price of the good decreases by 10%, what would we expect to happen to the quantity demanded?
- It will increase by 60%
  - It will increase by 6%
  - It will increase by 0.6%
  - It will decrease by 0.6%
  - It will decrease by 6%
11. Which one of the following goods is most likely to have a perfectly elastic demand?
- cigarettes
  - shoes
  - rice, in a developing country
  - a particular brand of butter
  - airline travel

12. Which of the following income elasticities could correspond to a *normal good* that is *income inelastic*?
- a. 0.5
  - b. 1.5
  - c. -1.5
  - d. 2.0
  - e. -0.5
13. Every week you buy rice, wheat, and oatmeal. Suddenly the price of rice rises. You decide to cut down on your rice purchases and get more wheat and oatmeal instead. This is an illustration of ...
- a. an income effect
  - b. a substitution effect
  - c. a normal good effect
  - d. a Giffen good
  - e. a price inelastic good
14. A population subsists largely on potatoes, plus small amounts of dairy products and vegetables. The price of potatoes rises, driving many poor families deeper into poverty. As a result, these families are forced to eliminate dairy products and vegetables from their daily diet and start eating even more potatoes than they did before. In this example potatoes are ...
- a. normal goods
  - b. inferior goods
  - c. Giffen goods
  - d. both a and c are correct.
  - e. both b and c are correct.
15. You get a notice in the middle of the semester stating that your monthly dorm fee is being doubled, effective immediately. You don't want to pay the higher fee, but it's not practical for you to move out of the dorm mid-semester. You decide to pay the extra charge now, and look for new housing option after exams are over. Which of the following statements best describes your situation?
- a. The dorm room is a Giffen good.
  - b. The dorm room is an inferior good.
  - c. Your short run demand for dorm housing is relatively inelastic.
  - d. Your long run demand for dorm housing is less elastic than your short run demand.
  - e. None of the above.

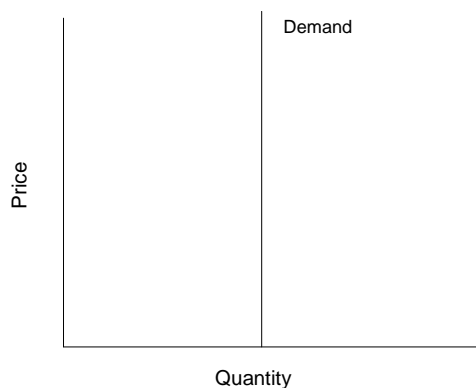
16. Which of the following goods is most likely to have high price elasticity of demand?
- A staple food.
  - A good that forms a very small part of a person's total budget.
  - A good for which there are many close substitutes.
  - A vital medicine.
  - None of the above.
17. Jake sells hot dogs at an outdoor stand. There are several other hot dog stands in the vicinity. There is a going price in the market for hot dogs. Which of the following statements is true about the demand for Jake's hot dogs?
- Demand for Jake's hot dogs is perfectly inelastic.
  - Demand for Jake's hot dogs is perfectly elastic.
  - Demand for Jake's hot dogs can be represented as a vertical line.
  - Demand for Jake's hot dogs can be represented as a downward sloping line.
  - None of the above.
18. Suppose that the price elasticity of supply for toothpaste is 0.2. If the price of toothpaste increases by 30%, what would we expect to happen to the quantity of toothpaste supplied?
- increase by 3%
  - decrease by 5%
  - increase by 60%
  - decrease by 15%
  - increase by 6%
19. Suppose a grocery store normally sells 100 cartons of milk per day and the price elasticity of demand for milk is 1.7. If the store lowers the price of milk by 10%, about how many cartons of milk will it then sell per week?
- 117
  - 83
  - 85
  - 100
  - 101.7
20. Which of the following is most likely to be an inferior good?
- eyeglasses
  - airplane tickets
  - caviar
  - opera tickets
  - discount bus tickets

## Answers to Active Review Questions

1. price inelastic
2. perfectly price elastic
3. income elasticity
4. negative, positive
5. unit elastic
6.  $S_A$  (the flatter curve)
7. quantity demanded; price
8. inelastic
9. elastic
10. more
11. True.
12. False.
13. False.
14. False.
15. False.
16. True.
17. There are very few good, close substitutes for the good or service; it is a good or service that people feel they need, rather than just want; or the good or service is a very small part of a buyer's budget.
18. The demand for lemonade in Central Park is price elastic.
19. -0.5
20. The demand curve for beach balls is relatively more elastic.

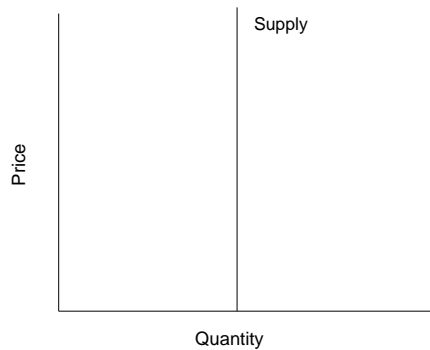
## Answers to Problems

1.



The textbook suggests the example of a medication that you must take every day in order to survive. Provided that you have the money to pay for it, your demand is likely to be perfectly inelastic over a range of prices, since skipping a pill would mean losing your life.

2.



3.

a. Revenue (at point A) = Price  $\times$  Quantity = \$3  $\times$  3 = \$9

b. Revenue (at point B) = \$5  $\times$  2 = \$10

c. In this case, an increase in price from \$3 to \$5 raises revenues from \$9 to \$10. When a price increase leads to higher revenues (that is, when revenues move in the same direction as the price), demand is **inelastic**.

4.

a. % change in price =  $[(5-3) / ((5+3)/2)] \times 100 = (2/4) \times 100 = + 50\%$

b. % change in quantity =  $[(2-3) / ((2+3)/2)] \times 100 = (1/2.5) \times 100 = - 40\%$

c. Price elasticity of demand = % change in quantity demanded / % change in price  
=  $-40\% / 50\% = -.8$

5. We cannot tell which demand curve is more elastic, because the scale is not shown. To compare the elasticities of the two curves based on their appearance, they would have to be on the same scale and passing through the same point.

## Answers to Self Test Questions

1. c
2. d
3. b
4. b
5. a
6. c
7. c
8. b
9. a
10. b
11. d
12. a
13. b
14. e
15. c
16. c
17. b
18. e
19. a
20. e