CHAPTER 4
ELASTICITY

Chapter in a Nutshell

When economists use the word elasticity, they mean sensitivity. Price elasticity of demand is a measure of buyers’ sensitivity to price changes. The elasticity of demand to price changes varies among different categories of goods. The reasons for this variation in elasticity are explored in the chapter. The price elasticity of demand can be calculated as the ratio of percentage change in quantity demanded to the percentage change in price. Cross elasticity of demand is the percentage change in demand for one good divided by the percentage change in price of another good. Income elasticity of demand is the percentage change in demand divided by the percentage change in income. Price elasticity of supply can also be measured. Supply becomes more sensitive to price changes given a longer time frame. The market-day supply is totally insensitive, or inelastic, to price changes while long-run supply is fairly elastic for most goods. Elasticity is an extremely useful concept for politicians as well as economists. Elasticity can be used to design more effective policies to generate tax revenues.

After you study this chapter, you should be able to:

- Explain how elasticity means sensitivity.
- List the determinants of price elasticity of demand.
- Distinguish between the elastic, inelastic, and unit elastic ranges on a straight-line demand curve.
- Contrast the cross elasticity of demand for substitutes and complements.
- Categorize goods as normal or inferior using the income elasticity of demand.
- Calculate price elasticity of supply for short-run and long-run supply curves.

Use elasticity concepts to evaluate tax policies.

Concept Check — See how you do on these multiple-choice questions.

What kind of sensitivity is described by the price elasticity of demand?

1. The price elasticity of demand is a measure of demand sensitivity to
   a. supply changes
   b. price changes
   c. income changes
   d. changes in tastes
   e. changes in the prices of other goods

To answer this question, focus on factors that apply to the demand side of the market.

2. Which of the following is not a determinant of the demand sensitivity to price changes?
   a. income level
   b. whether the good is a basic item
   c. time to adjust
   d. the availability of substitute goods
   e. the number of producers in the market

Know the various types of elasticity measures that we can use.
3. Goods can be classified as substitutes and complements using the concept of ____________________, while goods can be classified as normal or inferior using the concept of ____________________.
   a. income elasticity; cross elasticity
   b. cross elasticity; income elasticity
   c. price elasticity; income elasticity
   d. income elasticity; price elasticity
   e. price elasticity; cross elasticity

Time has an important role to play in both the elasticity of demand and the elasticity of supply.

4. As producers are given more time to respond to price changes, the elasticity of supply
   a. increases
   b. decreases
   c. approaches infinity
   d. approaches zero
   e. become equal to the demand elasticity

What types of commodities generate the most revenue when they are taxed?

5. Colbert, Louis XIV’s finance minister in France during the seventeenth century, thought air would be the perfect good to tax because
   a. the demand for air is elastic
   b. the demand for air is inelastic
   c. the tax would be a small burden for the peasantry
   d. air was one of the few things the king could tax
   e. the tax would be easy to calculate using a demand-supply diagram

Am I on the Right Track?

Your answers to the questions above should be b, e, b, a, and b. Elasticity is a concept used routinely by economists. It has many applications in the analysis of demand and supply. There is a formula to learn for calculating elasticities. With some practice, it is easy to use. Elasticities are always ratios of percentage changes in two variables. We use the elasticity value to understand the size of the impact that a change in one variable has on another. An example of the price elasticity of demand is as follows. If the price of strawberries increases by 10 percent and people buy 5 percent fewer strawberries, then the price elasticity of demand for strawberries is 5 percent divided by 10 percent or .5. Note that we adopt the convention of dropping the minus sign. An elasticity of .5 means that a 1 percent increase in the price of strawberries leads to a .5 percent decrease in the quantity demanded. Because the value for elasticity is less than one, we say that the demand for strawberries is insensitive to price changes or price inelastic.
Key Terms Quiz — Match the terms on the left with the definitions in the column on the right.

1. elasticity ______ a. price elasticity coefficient less than one
2. price elasticity of demand ______ b. the sensitivity of demand to income changes
3. total revenue ______ c. price elasticity coefficient greater than one
4. unit elastic ______ d. low income elasticities for basic foods
5. price elastic ______ e. price times the quantity purchased
6. price inelastic ______ f. as income decreases, the quantity demanded increases
7. cross elasticity of demand ______ g. the sensitivity of supply to price changes
8. income elasticity ______ h. price elasticity equal to one
9. income elastic ______ i. sensitivity of demand for one good to price changes in another good
10. income inelastic ______ j. the sensitivity of one variable to changes in another
11. Engel’s law ______ k. income elasticity greater than one
12. inferior goods ______ l. income elasticity less than one
13. price elasticity of supply ______ m. the sensitivity of demand to price changes

Graphing Tutorial

An important concept developed in this chapter is that of price elasticity of demand. Suppose that during the summer, you sell ice cream cones on the Boardwalk at Coney Island. You find that the data in the table below represent the demand schedule for ice cream cones:

<table>
<thead>
<tr>
<th>Price ($/cone)</th>
<th>Quantity Demanded (hundreds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

By plotting and connecting these points as shown below, you can draw the demand curve and see that it is linear. The slope is a constant, equal to -1, meaning that every $1 decrease in price causes an increase of 1 (hundred) in quantity demanded.
Even though the demand curve is a straight line, this is not a case of constant or unit elasticity. In fact, the price elasticity of demand changes as you change the price of an ice cream cone and move along the demand curve. For example, when you lower the price from $4 to $3, quantity demanded increases from 0 to 1, yielding a price elasticity of demand equal to 7. When you lower the price further from $3 to $2, quantity demanded increases from 1 to 2, so that the price elasticity of demand is now 1.66. The numerical value of the price elasticity changes at each point, becoming smaller as the price is lowered and quantity demanded increases.

The concept of price elasticity can help answer the question of whether you could increase total revenue by raising or lowering the price of an ice cream cone. If you are currently charging $3, then our calculation above shows that the price elasticity is 1.66 there. By lowering the price to $2, the theory indicates that total revenue should increase because you are operating in the elastic portion of the demand curve. Let’s check the numbers. If the price is $3, total revenue will be $3 times 100, or $300. When the price is reduced to $2, total revenue will become $2 times 200, or $400. Thus, total revenue will increase by $100 if you lower the price of an ice cream cone to $2.

For almost all demand curves, the price elasticity varies at different points along the curve. A business owner can use information about the price elasticity of demand to help determine whether price should be raised or lowered from its current level. Similarly, the government can use information about price elasticity to predict how consumers will respond to the change in the price of a good that occurs when a higher tax is imposed.

**True-False Questions** — If a statement is false, explain why.

1. The price elasticity of demand measures the sensitivity of demand to price changes. (T/F)

2. If a good has no close substitutes and is regarded as a necessity by many consumers, then demand for the good will be quite elastic. (T/F)

3. Cross elasticity of demand is the ratio of the percentage change in demand for a good to the percentage change in price for another. (T/F)

4. A 50 percent increase in price that results in a 90 percent decrease in the quantity demanded indicates that demand is elastic in this price range. (T/F)

5. Demands for most goods tend to become more elastic with the passage of time. (T/F)

6. If two goods are substitutes, then an increase in the price of one good will lead to an increase in the demand for the other good. (T/F)

7. If two goods are complements, then a decrease in the price of one good will result in a decrease in the demand of the other good. (T/F)

8. The price elasticity of demand is the same as the slope of the demand curve. (T/F)
9. Suppose that Jana’s income increases by 10 percent and she purchases a used car. The used car must be an inferior good to her. (T/F)

10. Engel’s law expresses the fact that people spend large percentages of any increase in income on food. (T/F)

11. Demand for low-priced goods like salt tends to be price inelastic because such goods usually account for a small percentage of a consumer’s budget. (T/F)

12. Given that peanut butter and jelly are complements, an increase in the price of peanut butter will lead to an increase in the demand for jelly. (T/F)

13. A long-run supply curve is relatively more price elastic than a short-run supply curve. (T/F)

14. If demand is unit elastic, then for any percentage change in price, the percentage change in quantity demanded will be one. (T/F)

15. A tax on a good causes the supply curve for that good to shift upward by the amount of the tax. (T/F)

Multiple-Choice Questions

1. If the price elasticity of demand is 2.5, then a 1 percent increase in price will lead to
   a. 2.5 percent increase in the quantity demanded
   b. decrease in demand but we cannot tell how big
   c. 2.5 percent decrease in demand
   d. 2.5 percent decrease in the quantity demanded
   e. 2.5 percent increase in demand

2. Suppose that Freddy’s quantity demanded for plums increases from two pounds to four pounds per week when price decreases from $1.25 per pound to $.75. Freddy’s demand is
   a. inelastic since the elasticity is .75
   b. elastic since the elasticity is 1.33
   c. unresponsive to price changes since the elasticity is so small
   d. elastic because he buys more as price decreases
   e. inelastic since he buys only twice as much

3. In 1857 a Prussian statistician calculated the income elasticity of demand for basic foods. His discovery that the income elasticity is ________________ is known as ________________.
   a. less than one; the cross elasticity of food
   b. greater than one; the cross elasticity of food
   c. less than one; the law of income elasticity of basic goods
   d. greater than one; Engel’s law
   e. less than one; Engel’s law
4. The concept of ___________________ compares the percentage change in demand of one good to the percentage change in price of another, while ____________________ is the concept used to examine the percentage change in demand that results from a percentage change in income.
   a. cross elasticity of demand; price elasticity of demand
   b. price elasticity of demand; cross elasticity of demand
   c. cross elasticity of demand; income elasticity of demand
   d. income elasticity of demand; price elasticity of demand
   e. price elasticity of demand; income elasticity of demand

5. If the price of asparagus rises by 25 percent, causing the quantity demanded of artichokes to increase by 75 percent, then artichokes and asparagus are
   a. complementary goods with a cross elasticity of 1/3
   b. inferior goods with an income elasticity of 1/3
   c. substitute goods with a cross elasticity of 3
   d. price elastic goods with elasticity equal to 3
   e. price inelastic goods with elasticity equal to 1/3

6. Given an income elasticity of demand of 0.5, we would expect that
   a. for a 0.5 percent increase in income, demand will increase by 1 percent
   b. for a 1 percent increase in income, demand will increase by 0.5 percent
   c. the good is an inferior good
   d. the good is definitely a luxury good
   e. the good may not have close substitutes

7. Which of the following is not a determinant of the price elasticity of demand?
   a. time to adjust
   b. availability of substitute goods
   c. whether the good is low-priced or high-priced
   d. whether the consumer is low or high income
   e. the slope of the demand curve

8. In the inelastic region along a straight-line demand curve, a price decrease leads to a total revenue decrease because
   a. price decreases proportionately more than quantity demanded increases
   b. price decreases proportionately less than demand
   c. price decreases but demand does not increase
   d. price decreases proportionately more than quantity demanded decreases
   e. the elasticity is greater than one

9. A price decrease for a good leads to a decrease in total revenue when there is a(n)
   a. close substitute for the good
   b. increase in supply of the good
   c. inelastic demand for the good
   d. closely-linked complement for the good
   e. decrease in income

10. The tax revenue is greater if the demand for the good is relatively inelastic because the
    a. supply curve will shift vertically by a greater amount if demand is inelastic
    b. quantity demanded decreases more as price increases along an inelastic demand curve
    c. quantity demanded increases more as price decreases along an inelastic demand curve
    d. supply curve will become steeper as the good is taxed
    e. quantity demanded decreases very little as price increases along an inelastic demand curve
11. Along a linear demand curve, from top to bottom (higher price levels to lower price levels), elasticity varies from
   a. elastic, to unit elastic, to inelastic
   b. inelastic, to unit elastic, to elastic
   c. unit elastic, to elastic, to inelastic
   d. elastic, to inelastic, to unit elastic
   e. unit elastic, to inelastic, to elastic

12. If the price elasticity of demand is 2 and the quantity demanded increased by 25 percent, then price must have
   a. increased by 50 percent
   b. increased by 12.5 percent
   c. decreased by 50 percent
   d. decreased by 12.5 percent
   e. decreased by 25 percent

13. An increase in the price of aspirin is likely to be paired with a(n) __________________ in the demand for Tylenol because the two goods are ________________.
   a. increase; complements
   b. decrease; complements
   c. increase; substitutes
   d. decrease; substitutes
   e. increase; elastic

14. Suppose that a DVD rental shop opens in a small town with one movie theater. Ceteris paribus, one would expect that the demand for movie tickets will become
   a. less elastic as a result
   b. much greater since most videos are of mediocre quality
   c. much smaller because videos are cheaper
   d. more elastic as a result
   e. more negatively cross elastic since videos and movies are substitutes

15. If two goods are close substitutes for one another, then we would expect the cross elasticity of demand between them to be
   a. large and positive
   b. large and negative
   c. small and positive
   d. small and negative
   e. indeterminate unless we are given specific numbers for the calculation

16. One would expect the cross elasticity of demand between apple pie and ice cream to be _______________ and the cross elasticity of demand between ice cream and frozen yogurt to be _______________.
   a. negative; positive
   b. positive; negative
   c. one; greater than one
   d. one; less than one
   e. less than one; greater than one
17. Calculations of income elasticities of demand for food show them to be higher for poor countries than for rich countries because
   a. food is not an inferior good in poor countries
   b. the demand for food does not obey Engel’s law in poor countries
   c. the demand for food is so price inelastic in rich countries
   d. a larger percentage of any given change in income will be spent on food in poor countries
   e. such income elasticities are often negative in rich countries

18. Suppose that Tom’s Market in Yellow Springs runs a sale on avocados that are perfectly ripe for making guacamole, decreasing the price by 50 percent. It would make sense for Tom’s to
   a. cut the price of corn chips
   b. decrease the price of salsa
   c. increase the price of corn chips
   d. increase the price of salsa
   e. leave all other prices the same

19. Engel’s Law maintains that as household incomes increase, expenditures on basic foods such as milk, potatoes, and bread will
   a. increase by a smaller percentage than the increase in income
   b. decrease by a smaller percentage than the increase in income
   c. stay the same
   d. increase by a larger percentage than the increase in income
   e. decrease by a larger percentage than the increase in income

20. The increase in the elasticity of supply that can be observed moving from the market day to the short run and to the long run reflects
   a. the increase in demand due to population change in the long run
   b. changing consumer tastes
   c. rising incomes that allow more to be produced as time passes
   d. increasing numbers of producers in the market
   e. the ability of producers to better respond to price changes given more time

The following questions relate to the applied and global perspectives in the text.

   a. the result of price-gouging by the giant oil companies
   b. remarkably small given the extent of destruction of oil industry infrastructure in the Gulf region
   c. higher than might have been expected given how elastic the demand for gasoline has become
   d. the result of increased demand from India and China, not Hurricane Katrina
   e. consistent with the typical inelastic response of consumer demand to gasoline price changes

22. A serious problem facing less-developed countries is that most of their exports are
   a. agricultural goods with low price elasticities so that an increase in exports decreases revenue
   b. agricultural goods with low price elasticities so that a decrease in exports decreases revenue
   c. agricultural goods with high price elasticities so that an increase in exports decreases revenue
   d. manufactured goods with high price elasticities so that an increase in exports decreases revenue
   e. manufactured goods with low price elasticities so that an increase in exports decreases revenue
23. The cross-elasticity of demand between the amount purchased of wild salmon and the price of farm-raised salmon is
   a. a large negative value so the goods are complements that are closely linked in consumption
   b. close to zero suggesting that the demand for wild salmon is insensitive to the price of farm-raised salmon
   c. a large positive value so the goods are close substitutes
   d. hard to calculate because farm-raised salmon has not yet gained acceptance by consumers
   e. positive and close to zero just the same as the income elasticity of demand for most food items

**Fill in the Blanks**

1. The price elasticity of demand is calculated as the _______________________ divided by the _______________________.

2. An inferior good has an income elasticity of demand that is _________________ while a normal good has an income elasticity that is _________________.

3. If the intent of government policy is to raise revenue through taxation, then goods with ________________ demands should be taxed.

4. When demand is elastic, a(n) ___________________ in price leads to an increase in total revenue.

5. The price elasticity of demand increases in the long run because consumers have time to _____________________, while the price elasticity of supply increases in the long run because producers have time to _____________________.

**Discussion Questions**

1. Explain why a firm would never price in the inelastic region of its demand curve if it could avoid doing so.

2. Why are income elasticities for basic foods relatively low?
3. Would you expect the cross elasticity of demand for Budweiser with respect to changes in the price of Coors to be positive or negative? Why? Would the cross elasticity of demand for Budweiser with respect to the price of pretzels be positive or negative? Explain.

4. Explain the logic behind Colbert's desire to tax air.

Problems

1. Why are numerical values for price elasticity large, indicating an elastic demand, at high prices along linear demand curves and smaller, indicating an inelastic demand, at low prices? (Hint: Consider the formula we use for calculating elasticity coefficients and the nature of percentage changes for small numbers and large numbers.)
2. The following table shows Spike’s demand for New York Knicks’ basketball tickets:

<table>
<thead>
<tr>
<th>Price ($/ticket)</th>
<th>Quantity Demanded (number of tickets purchased)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

a. Calculate the price elasticity of demand between the prices of $10 and $20.

b. Calculate the price elasticity of demand between the prices of $20 and $40.

c. Calculate the price elasticity of demand between the prices of $40 and $50.

d. Identify each of the elasticities you calculated above as elastic or inelastic and calculate the changes in total revenue between each pair of prices.
3. The graph below shows the market for cigarettes.

![Graph of market for cigarettes](image)

a. Identify the equilibrium price and the quantity demanded and supplied at that price.

b. Suppose a tax equal to $1 per pack is placed on cigarettes. Draw the new supply curve. Explain how you drew the new supply curve.

c. What is the new equilibrium price, and what are the quantity demanded and supplied at this price?

d. How much revenue does the government receive from this tax? How would the revenue generated from the tax change if the demand for cigarettes became more elastic? Explain.
Everyday Applications

1. This morning’s paper had an ad in it for Click Camera, which was running a film sale — buy two rolls and get the third one free. Does this marketing strategy embody assumptions about the price elasticity of demand for film? Explain.

2. Why do we often see two-liter bottles of Pepsi and Coke both priced at $.99 sitting next to each other on grocery shelves? Does the cross elasticity of demand have anything to do with this observation?

Economics Online

Consider what is happening to the price elasticities of demand for products sold via the internet. Visit the site (http://www.idci.fr/doc/conf/sic/papers_2001/ellison.pdf) to find a paper written by Glenn and Sara Ellison that examines e-commerce. Based on the figures and ideas presented by the Ellisons, what is happening to the price elasticities of products purchased on the internet?

Answers to Questions

Key Terms Quiz

da. 6  
fb. 8  
c. 5  
d. 11  
e. 3  
f. 12  
g. 13  
h. 4  
i. 7  
j. 1  
k. 9  
l. 10  
m. 2

True-False Questions

1. True
2. False. If a good has no close substitutes and is a necessity, then demand will be relatively inelastic.
3. True
4. True
5. True
6. True
7. False. For complements, a decrease in the price of one good will lead to an increase in the amount purchased of the other good.
8. False. The price elasticity of demand is equal to the percentage change in quantity demanded divided by the percentage change in price, whereas the slope of the curve is the change in price divided by the change in quantity.
9. False. Income has increased and the quantity of used cars purchased increased as a result so the used car is a normal good.
10. False. Engel's law suggests that the demand for food is income inelastic so that a 1 percent increase in income leads to a less than 1 percent increase in the quantity of food demanded.
11. True
12. False. If the price of peanut butter increases, then the demand for jelly will decrease.
13. True
14. False. Unit elastic means that for a 1 percent increase in price, the quantity demanded decreases by 1 percent and vice versa.
15. True
Multiple-Choice Questions

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

Fill in the Blanks

1. percentage change in quantity demanded; percentage change in price
2. negative; positive
3. inelastic
4. decrease
5. search for substitutes; adjust production levels

Discussion Questions

1. If demand is price inelastic, an increase in price results in an increase in total revenue. This is because a 1 percent increase in price leads to a less than 1 percent decrease in quantity demanded. Therefore, the decrease in quantity demanded is more than offset by the increase in price. If the firm is able to raise price when the demand is inelastic, it will do so in order to raise total revenue.

2. The fact that the demands for basic foods are income inelastic was discovered by the Prussian statistician Engel and is called Engel’s law. It makes sense that these demands would be income inelastic. As our incomes rise, we will purchase somewhat larger amounts of food and, perhaps, better selections of food too. However, one can eat only so much. Thus, the demand for food isn’t terribly sensitive to income changes, translating into a low income elasticity.

3. Budweiser and Coors are substitute goods. Therefore, an increase in the price of Coors will lead to an increase in the quantity demanded of Budweiser. It makes sense that most of these close substitutes have very similar prices based on the fact that they are close substitutes, so the cross elasticities will be positive. Budweiser and pretzels are complements. Therefore, an increase in the price of pretzels will lead to a decrease in the quantity demanded of Budweiser. These two goods are consumed together, so the cross elasticity will be negative.

4. From the perspective of a finance minister like Colbert, the problem with a tax on a particular good is that a consumer can avoid the tax by not consuming the good. For example, the simple way to avoid an increase in the tax on cigarettes is to stop smoking! But that might not be so simple since cigarettes are addictive, causing their demands to be quite inelastic. The trick for a finance minister is to find a good for which the demand is so inelastic that the consumer cannot cut back the amount purchased as it becomes more expensive. Air is such a good. A tax on air would be completely unavoidable for consumers. And the king owned the air in France at the time! So, it was his to tax.

Problems

1. In the elastic region, at the top of the linear demand curve, a change in quantity demanded is a large percentage change since the quantity values are small numbers, e.g., from 1 to 2 or from 2 to 3. The changes in price are small percentage changes since the price figures are relatively large. Therefore, the quotient of percentage change in quantity demanded and percentage change in price is a large number, so the demand is elastic. By similar reasoning, at the bottom of the linear demand curve, a change in quantity demanded is a small percentage change since the quantity values are bigger numbers. The changes in
price are big percentage changes since the price values are low. Thus, the elasticity value we get is small, so the demand is inelastic there.

2. a. .43; For a 1 percent increase in price, there is a .43 percent decrease in the quantity demanded.
   
b. 1.5; For a 1 percent increase in price, there is a 1.5 percent decrease in the quantity demanded.
   
c. 9; For a 1 percent increase in price, there is a 9 percent decrease in the quantity demanded.
   
d. At P = $10, total revenue = $200; at P = $20, total revenue = $300; at P = $30, total revenue = $300; at P = $40, total revenue = $200; at P = $50, total revenue = $0. As price increases when demand is inelastic, total revenue increases. As price increases when demand is elastic, total revenue decreases.

3. a. The original equilibrium price is $3 per pack, and the quantity demanded is equal to the quantity supplied at 6 million packs.
   
b. The new supply curve is shown in the diagram below as S’. If you look closely, S’ is shifted up vertically from the original supply curve by the amount of the tax, $1. The original supply curve and S’ are parallel with the vertical distance between them equal to $1. This reflects the fact that the producer must pay $1 to the government for every pack of cigarettes that is sold. Therefore, to supply any quantity, the price must be $1 higher.
   
c. Reading from the diagram below, the new equilibrium price is approximately $3.60 per pack, and the new quantity demanded equals quantity supplied at about 4.8 million packs.
   
d. The revenue is shown in the diagram below as the area of the rectangle marked by heavy lines. This area can be computed as $1 times 4.8 million packs or $4.8 million dollars. If the demand for cigarettes becomes more elastic, tax revenues would decrease. Fewer than 4.8 million packs would be sold as the price rose with the tax.
**Homework Questions**

**True-False Questions** — If a statement is false, explain why.

1. If the demand for a good is elastic and the price falls, then total revenue will increase. (T/F)

2. Engel’s Law suggests that if income increases by 20 percent, the demand for basic foods will increase by more than 20 percent. (T/F)

3. The demand for cigarettes is relatively inelastic, which makes them a good commodity for government to tax. (T/F)

4. Hamburger and French fries will likely have a negative cross elasticity of demand. (T/F)

5. The long-run supply curve for a good is more inelastic than the short-run supply curve. (T/F)

**Multiple-Choice Questions**

1. Suppose that a 10 percent increase in the income of frequent flyers is associated with a 50 percent increase in airline ticket sales. It would be correct to assert that
   a. a 5 percent increase in income leads to a 1 percent increase in ticket sales
   b. a 1 percent increase in income leads to a 5 percent increase in airline ticket sales so the demand for airline tickets is income elastic
   c. a price decrease for airline tickets would lead to a total revenue increase
   d. the demand for airline tickets is sensitive to price changes
   e. people view air travel as an inferior good

2. If the elasticity of demand is equal to 2 and price decreases by 30 percent, then we can expect quantity demanded to increase by
   a. 15 percent
   b. 60 percent
   c. 6 percent
   d. 1.5 percent
   e. 2 percent

3. Basic foods are goods for which the income elasticity of demand is
   a. negative so they are inferior goods
   b. less than one so they are inferior goods
   c. quite large so that an increase in income leads to a proportionately larger increase in demand
   d. between zero and one so the demand in income inelastic
   e. higher than the income elasticity of demand for luxury foods like caviar
4. If a seller finds it possible to increase total revenue by raising price, then the demand for the good must be
   a. inelastic
   b. unit elastic
   c. increasing
   d. related to the income elasticity
   e. elastic

5. Over time, both price elasticities of demand and elasticities of supply tend to increase because consumers
   and producers
   a. are always less responsive given enough time
   b. are noted for taking a long time to make decisions
   c. are able to make adjustments to price changes given sufficient time
   d. prefer higher prices in the long run
   e. cannot be expected to make important decisions too rapidly

Discussion Questions/Problems

1. Suppose that Wittenberg University lowers the price of basketball tickets from $5 per game to $3 per game
   and attendance increases from 2,000 to 5,000. Calculate and interpret the price elasticity of demand for
   basketball tickets. Calculate the change in total revenue. Was the price cut a good idea from the perspective
   of the Wittenberg University Business Office? Explain.

2. In the space below, sketch a pair of demand and supply diagrams. Draw an inelastic demand curve in one
   of the diagrams and an elastic demand curve in the other. Now shift the supply curve upward by the same
   vertical distance, representing a per unit tax on the good in each diagram. Use the graphs you have drawn
   to explain which type of good it makes sense to tax — the one with the inelastic demand or the one with
   the elastic demand.