Recitation #5 – Week 02/08/2009 to 02/14/2009
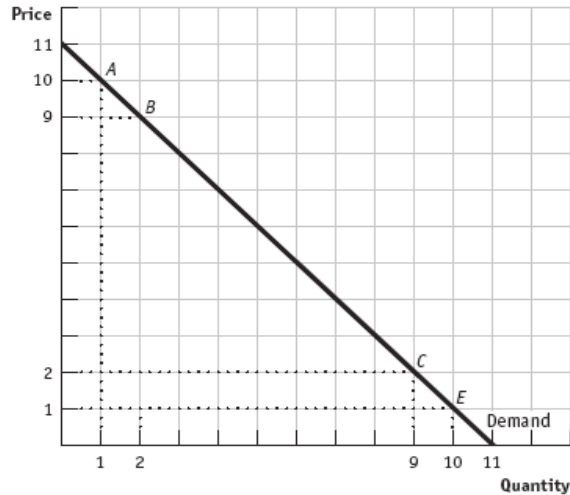
Chapter 6 - Elasticity

1. This problem explores the midpoint method of calculating percentages and why this method is the preferred method when calculating price elasticity of demand or price elasticity of supply. Consider the demand curve in the figure below to answer this question.

a. Suppose the initial price and quantity on the above demand curve is represented by point *A* and then the price and quantity change to point *B*. Calculate the percentage change in price and the percentage change in quantity using the following formula:

$$\text{Percentage change} = \frac{\text{new value} - \text{old value}}{\text{old value}} \times 100$$

Note: we are purposefully not using the midpoint method for parts (a) through (e) of this problem so that we can compare these results to the results we would get if using the midpoint method.

b. Using the percentage changes you calculated in part (a), calculate the price elasticity of demand from point A to point B, using the following formula:

$$\text{Price elasticity of demand} = \left| \frac{\%\ \text{change in quantity demanded}}{\%\ \text{change in price}} \right|$$

c. Redo part (a) starting at point B and moving to point A. Use the same formula as that given in part (a).

d. Calculate the price elasticity of demand from point B to point A using the formula given in part (b).

e. Are your values for the price elasticity of demand the same in parts (a) and (d)? Now, let's recalculate the price elasticity of demand using the midpoint method.

f. Suppose you are initially at point A and that you move to point B. Calculate the percentage change in price and the percentage change in quantity using the following (midpoint method) formula:

$$\%\ \text{change} = \frac{\text{new value} - \text{old value}}{\dfrac{\text{old value} + \text{new value}}{2}} \times 100$$

g. Using the percentage changes you calculated in part (f), calculate the elasticity of demand from point A to point B using the following formula:

$$\text{Price elasticity of demand} = \left| \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}} \right|$$

h. Suppose you now start at point B and move to point A. Calculate the percentage change in price and the percentage change in quantity using the formula given in part (f).

i. Calculate the price elasticity of demand from point B to point A using the formula given in part (g).

j. Are the values you calculated for the price elasticity of demand using the midpoint method the same in parts (g) and (i)? Summarize the significance of the midpoint method when calculating the price elasticity of demand or the price elasticity of supply.

2. Use the figure from problem 1 to answer this question.

a. Calculate a value for the price elasticity of demand between points C and E using the midpoint method. Does it matter which point you select as your initial point?

b. Compare the value you calculated in part (a) of this problem with the price elasticity of demand value between points A and B that you calculated in part (g) of problem. Are these two price elasticities of demand the same?

c. Demand is elastic when the absolute value of the percentage change in the quantity demanded exceeds the absolute value of the percentage change in the price. Given the values you compared in part (b), is demand elastic between points A and B or between points C and E?

d. Demand is inelastic when the absolute value of the percentage change in the quantity demanded is less than the absolute value of the percentage change in the price.

Given the values you compared in part (b), is demand inelastic between points A and B or between points C and E?

3. Use the figure below of a linear demand curve to answer this set of questions.
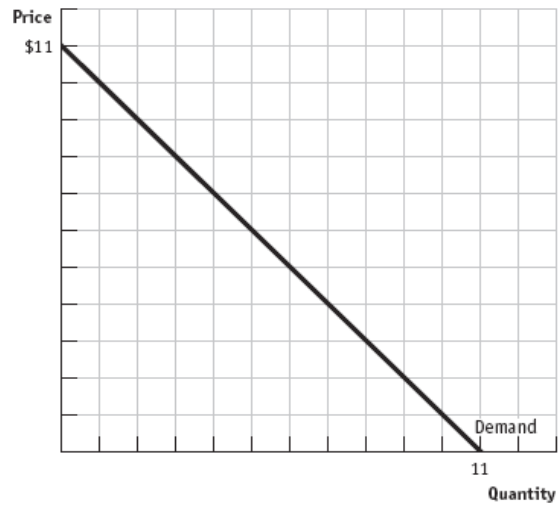
a. Based on the above figure, fill in the following table:

Price	Quantity demanded	Total revenue
$ 0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

b. At what price is total revenue maximized? (Hint: this may be a price that is not included in your table.)

c. Suppose the price is initially $6, but it then decreases to $5. Calculate the elasticity of demand between these two points on the demand curve using the midpoint method.

d. Based on your calculations in part (c), describe the relationship between the absolute value of the percentage change in the quantity demanded and the absolute value of the percentage change in price when moving from a price of $6 to a price of $5.

8. When Mario's income increases by 10%, his consumption of noodles decreases from 100 units a year to 70 units a year, while his consumption of salmon increases from 20 units a year to 60 units a year.

a. What is Mario's income elasticity of demand for noodles? Price Quantity demanded by children Quantity demanded by adults $2 100 100 1 300 120

b. What is Mario's income elasticity of demand for salmon?

c. Is either of these goods income elastic for Mario?

d. Is either of these goods income inelastic for Mario?

e. From Mario's perspective, is either of these goods a luxury good? Explain your answer.

f. From Mario's perspective, is either of these goods an inferior good? Explain your answer.

10. The following table describes a linear supply curve for bicycles in Microland.

Price	Quantity supplied of bicycles
$ 0	0
100	200
200	400
300	600
400	800
500	1,000

a. Graph this supply curve and then write an equation for this supply curve in slope intercept form.

Price

Quantity
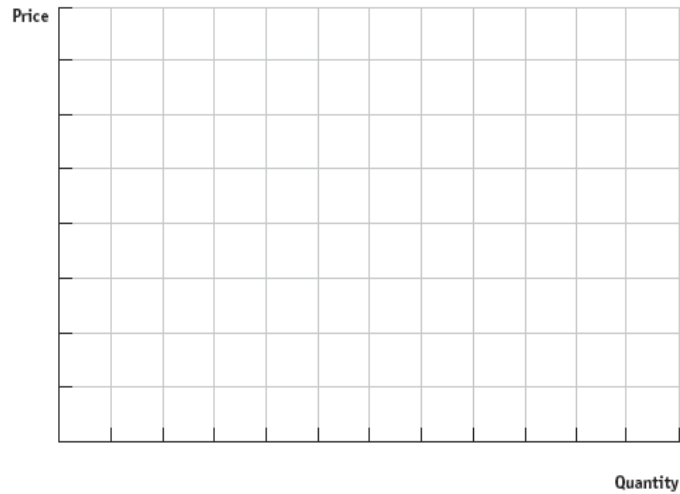
b. Suppose suppliers initially sell bicycles for $200 but then decrease their price to $100. Using the midpoint method, what is the value of the price elasticity of supply between these two points on the supply curve?

c. Suppose suppliers initially sell bicycles for $400 and then the price increases to $500. Using the midpoint method, what is the value of the price elasticity of supply between these two points on the supply curve?

d. Did your values in part (b) and part (c) of this question differ or were they the same? You might redo this problem with another set of values for a different linear demand curve that goes through the origin. Do you get the same result? Generalize your findings in a simple statement.

Chapter Review Questions

1. When the absolute value of the percentage change in quantity demanded is greater than the absolute value of the percentage change in price, demand is

a. inelastic.

b. elastic.

2. If the price is initially $10 and then increases to $15, the absolute value of the percentage change in price using the midpoint method is

a. 50%.

b. 40%.

c. 5%.

d. 4%.

3. The midpoint method for calculating price elasticities provides a means of

a. ensuring that all price elasticities have positive values.

b. ensuring that all price elasticities have negative values.

c. generating consistent measures of price elasticities between two points on a demand

or supply curve without regard to which point is the initial point.

d. simplifying the calculation of price elasticities so that all elasticity values are whole numbers.

4. A horizontal demand curve is perfectly

a. elastic.

b. inelastic.

5. If the price elasticity of demand between two points on a demand curve is equal to 1.5,

then demand between those two points is

a. price elastic.

b. price inelastic.

6. If the price elasticity of demand equals infinity, then the demand curve is

a. horizontal.

b. vertical.

7. A small value (less than one) for the price elasticity of demand indicates that consumers are very price

a. sensitive and that a small percentage change in price will lead to a large percentage change in the quantity demanded when both changes are measured in absolute value terms.

b. insensitive and that a small percentage change in price will lead to an even smaller percentage change in the quantity demanded when both changes are measured in absolute value terms. Use the diagram below of a linear demand curve to answer the next three questions.
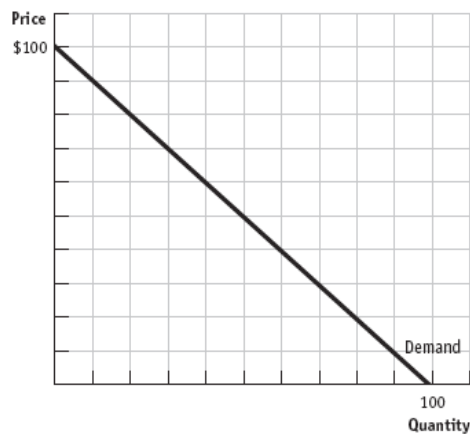
8. Suppose price is initially $60. If price increases to $70, this will cause the quantity demanded to decrease while

a. total revenue increases.

b. total revenue decreases.

c. total revenue does not change.

d. the effect on total revenue depends on consumers' reactions to the price increase.

9. Suppose you are a producer and the demand curve in the graph represents the demand for your product. Furthermore, suppose you are currently selling this product at a price of $30. If you raise the price to $40 and demand remains unchanged, total revenue will _____ because the price effect is _____ than the quantity effect.

a. increase; larger

b. increase; smaller

c. decrease; larger

d. decrease; smaller

10. Suppose you are a producer and the demand curve in the graph represents the demand for your product. To maximize total revenue you should sell the good for _____, resulting in total revenue of _____.
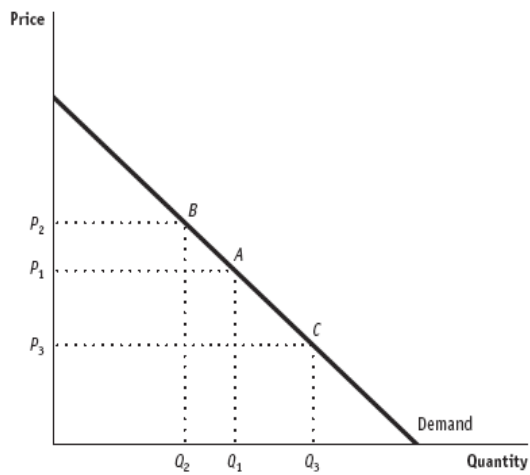
a. $100; $100,000

b. $60; $2,400

c. $40; $2,400

d. $50; $2,500

Use the figure below to answer the next two questions, where point A is the midpoint of the depicted linear demand curve.

11. At prices greater than P1 demand is _____, while at prices less than P1 demand is _____, and at price P1 demand is _____.

a. elastic; elastic; unit elastic

b. inelastic; inelastic; unit elastic

c. elastic; inelastic; unit elastic

d. inelastic; elastic; unit elastic

12. Suppose price is initially at P1. Which of the following statements is true?

a. If price rises to P2, then the quantity effect will dominate over the price effect and total revenue will increase.

b. If price falls to P3, then the quantity effect will dominate over the price effect and total revenue will increase.

c. If price rises to P2, then the price effect will dominate over the quantity effect and total revenue will increase.

d. If price falls to P3, then the price effect will dominate over the quantity effect and total revenue will decrease.

13. Which of the following statements is true?

a. The longer the time period of adjustment to a change in the price of the good, the more elastic the demand for that good.

b. Goods that have many close substitutes typically have price elastic demand.

c. The demand for nonessential goods is more elastic than the demand for goods that are necessities.

d. All of the above statements are true.

14. Tea and coffee are often viewed as substitutes for one another. Which of the following cross-price elasticity values is most likely for tea and coffee?

a. −0.5

b. 1.5

15. The price of movie tickets increased 10% this year. Which of the following statements is most likely to be true?

a. The quantity of popcorn sold at movie theaters decreased this year.

b. Video movie rentals increased this year.

c. If the price elasticity of demand for movie tickets is greater than one, total revenue

at the movie theaters decreased.

d. All of the above statements are true.

16. The cross-price elasticity of demand between movie tickets and movie theater popcorn is estimated to equal −0.6. Suppose movie ticket prices increased by 20% this year. The percentage change in the quantity demanded of movie theater popcorn will be a(n)

a. increase of 1.2%

b. increase of 12%.

c. decrease of 1.2%.

d. decrease of 12%.

17. This year Joe's income increased by 15% while the quantity of bananas he demanded increased by 8% and the quantity of orange juice he demanded increased by 6%. Which of the following statements is true for Joe?

a. Bananas are a normal good and orange juice is an inferior good.

b. Bananas are an inferior good and orange juice is a normal good.

c. Bananas and orange juice are both normal goods.

d. Bananas and orange juice are both inferior goods.

18. Use the data in the table below to answer this question. The table provides information about prices, quantity demanded, and income for Sue for two different years.

Year	Good	Price	Quantity demanded	Income
2004	Pizza	$ 6	10	
2004	Books	9	4	
2004				$200
2005	Pizza	6	7.5	
2005	Books	9	5	
2005				250

Calculate Sue's income elasticity of demand for pizza for this time period. Sue's income elasticity of demand for pizza equals _____ and pizza is a(n) _____ good.

a. 1; normal

b. 1; inferior

c. 1.65; inferior

d. 1.65; normal

19. Use the information in the table below to answer this question.

Good	Quantity demanded initially	Price initially	Quantity demanded after price change	New price
Pizza	10	$ 6	8	$6
Books	4	12	5	9

Calculate the cross-price elasticity of demand between the quantity demanded of pizza and the price of books. What is the relationship between pizza and books given this cross price elasticity of demand value?

a. Pizza and books are complements.

b. Pizza and books are substitutes.

c. Pizza is an inferior good and books are a normal good.

d. Pizza is a normal good and books are an inferior good.

20. Suppose the income elasticity of demand for a good is greater than one. Which of the following statements is true?

a. The percentage change in the quantity demanded of this good is larger than the percentage change in income.

b. This good is a necessity, since as income increases the quantity demanded of the good increases.

c. This good is an inferior good, since as income increases the quantity demanded of the good increases at a much greater rate than the rate of increase in income.

d. This good could not be a luxury good, since income and the quantity demanded have a positive relationship.

21. Suppose there is an influx of new workers in a community. This will likely result in

a. an increase in the price elasticity of demand for all normal goods.

b. an increase in the price elasticity of supply for goods produced in this community.

c. a decrease in the price elasticity of demand for most goods.

d. little change in any elasticity measure for this community.

22. Acme Manufacturing produces 1,000 widgets when the price of widgets is $20 per widget, and 1,200 widgets when the price of widgets is $22 per widget. Using the midpoint method, what is the value of the price elasticity of supply?

a. 1.9   c. 0.5

b. 0.6   d. 2

23. Acme Manufacturing originally was able to produce 1,000 widgets at a price of $20 per widget, and 1,200 widgets at a price of $22 per widget. Suppose that there is an influx of new workers into the community and Acme now finds it can produce 1,200 widgets at a price of $20 per widget, and 1,600 widgets at a price of $22 per widget. Which statement best describes Acme's situation?

a. Acme's supply curve is now more price-inelastic which implies that as the price increases Acme can now supply a greater quantity of the good than it could initially.

b. Acme's supply curve is unaffected by this change in labor: a price increase for widgets simply causes a movement along the supply curve for widgets.

c. Acme's supply curve is now more price-elastic which implies that as the price increases Acme can now supply a greater quantity of the good than it could initially.

d. The availability of labor has an unpredictable effect on Acme Manufacturing.

Answers to Chapter Review Questions

1. Answer b. Demand is price elastic when the absolute value of the percentage change in the quantity demanded is greater than the absolute value of the percentage change in price.

2. Answer b. To find this value, you take the absolute value of the following:

$$\left| \frac{15 - 10}{\frac{10 + 15}{2}} \right| \times 100$$

This gives you the absolute value of the percentage change in price, which is equal to 40%.

3. Answer c. Price elasticities may have negative values or positive values. For example, for both cross-price elasticity of demand and income elasticity of demand, the values may be positive, negative, or equal to zero. The midpoint method for calculating price elasticities provides a method for getting identical values no matter which point is your initial point when making the calculation. Price elasticities are not always whole numbers.

4. Answer a. This is definitional: it is an extreme case of elasticity in which demanders are extremely price sensitive.

5. Answer a. Since the value of price elasticity of demand is greater than one, this implies that the absolute value of the percentage change in the quantity demanded is greater than the absolute value of the percentage change in price, which means that demand is elastic between these two points.

6. Answer a. This is definitional: when the demand curve is horizontal, it tells us that consumers are very price sensitive, and at the current price there is infinite demand for the good. When the demand curve is perfectly vertical, it tells us that consumers are not price sensitive, since no matter what the price they will continue to demand the same amount of the good.

7. Answer b. When the price elasticity of demand has a value less than one, this implies that the absolute value of the percentage change in the quantity demanded is less than the absolute value of the percentage change in the price of the good. Consumers are not price sensitive: they will continue to demand a similar amount of the good even though the price has increased.

8. Answer b. When price rises from $60 to $70, total revenue changes from $2,400 to $2,100. The price of $60 is above the midpoint on the given demand curve, so an increase in price above $60 implies that price is increasing in the elastic region of the demand curve. As price rises in the elastic portion of the demand curve, this results in a decrease in total revenue.

9. Answer a. When price rises from $30 to $40, you are moving along the demand curve in the inelastic region. An increase in price in the inelastic region of the demand curve results in an increase in total revenue. In this case, total revenue was initially $2,100, and with the price increase total revenue is now equal to $2,400.

10. Answer d. Total revenue is maximized at the unit elastic point on the demand curve. For a linear demand curve, this occurs at the midpoint. In this example, the midpoint is at a price of $50 and a quantity of 50 units.

11. Answer c. This is definitional: above the midpoint on a linear demand curve, demand is elastic; below the midpoint on a linear demand curve, demand is inelastic; and at the midpoint on a linear demand curve, demand is unit elastic.

12. Answer d. When price rises above $P1$, the quantity effect is dominant over the price effect and this dominance results in total revenue decreasing. When price falls below $P1$, the price effect is dominant over the quantity effect and this dominance results in total revenue decreasing.

13. Answer d. All of these statements are true. When there are many substitutes available for a good, demand is more elastic. Demand is also more elastic the longer the time period for adjustment. Goods that are not necessities and therefore do not have to be consumed have more elastic demand than do goods that are necessities.

14. Answer b. Two goods are substitutes for one another when the cross-price elasticity of demand between the two goods is positive. This elasticity is positive, since as the price of one of the goods increases this leads to an increase in the quantity demanded of the other good.

15. Answer d. Each of these statements is likely to be true. Popcorn sold at movie theaters is likely to be a complementary good with respect to movie tickets. When movie tickets increase in price, fewer movie tickets are demanded, and this decrease in the quantity demanded results in fewer units of popcorn being sold. Similarly, movie tickets and video rentals are likely to be substitutes with respect to each other: an increase in the price of movie tickets will likely result in increased demand for video rentals. If the price elasticity of demand for movie tickets is greater than one, this implies that demand is elastic, and an increase in price in the elastic segment of the demand curve causes total revenue to decrease.

16. Answer d. To compute this answer, first recall that the cross-price elasticity is the ratio of the percentage change in the quantity demanded of good A divided by the percentage change in the price of good B. The question provides the value for the cross-price elasticity of demand as well as the percentage change in the price of movie tickets. Plugging these values into our equation for cross-price elasticity of demand, we have $-0.6 = x/20\%$ where x is the percentage change in the quantity demanded of movie theater popcorn. Solving this equation, the percentage change in the quantity demanded of movie theater popcorn is a decrease of 12%.

17. Answer c. Joe's income increased and so did his consumption of both bananas and orange juice. Therefore they both must be normal goods.

18. Answer b. To find the income elasticity of demand, recall that this is the ratio of the percentage change in the quantity demanded of the good divided by the percentage change in income. The percentage change in the quantity demanded of pizza is −25% (using the simple formula for percentage changes given in the Chapter Objectives section of the Study Guide), while the percentage change in income is also 25%. Thus, the income elasticity of demand is equal to −1. Pizza is an inferior good, since as income increases, the quantity demanded decreases.

19. Answer b. As the price of books decreases we see from the table that the quantity of pizzas demanded decreases. This tells us that these two goods are substitutes for one another since as the price of one of the goods decreases this leads consumers to substitute away from the other good and decrease the quantity they demand of the other good at every price.

20. Answer a. When income elasticity of demand is greater than one, this tells us that the good is not an inferior good, since as income increases this leads to an increase in the quantity demanded of the good. From the definition of income elasticity of demand, a value greater than one implies that the percentage change in the quantity demanded of the good is greater than the percentage change in income. When the income elasticity of demand is greater than one, this implies that the good is a luxury, since the percentage increase in the quantity demanded is increasing at a faster rate than the percentage increase in income.

21. Answer b. When there is an influx of new workers into a community, labor becomes more plentiful. Since labor is an input in the production of goods, this likely makes the supply of goods more elastic.

22. Answer a. To find the price elasticity of supply, use the midpoint method and calculate the percentage change in the quantity supplied divided by the percentage change in the price of the good. Thus, the price elasticity of supply equals

$$\frac{\dfrac{1{,}200 - 1{,}000}{\dfrac{1{,}000 + 1{,}200}{2}}}{\dfrac{22 - 20}{\dfrac{20 + 22}{2}}} = 1.9$$

23. Answer c. If you sketch out the relationships between price and the quantity supplied, you will notice that the influx of workers results in Acme Manufacturing supply's curve shifting out to the right. This causes the price elasticity of supply to increase, resulting in more priceelastic supply. Calculation of the new value of the price elasticity of supply would be equal to

$$\frac{\dfrac{1{,}600 - 1{,}200}{\dfrac{1{,}200 + 1{,}600}{2}}}{\dfrac{22 - 20}{\dfrac{20 + 22}{2}}} = 3$$

Supply is now more price elastic.