ANSWERS TO END-OF-CHAPTER QUESTIONS

18-1 Explain why the choice between 1, 2, 3, 4, 5, 6, 7, and 8 "units" or 1000, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 movie tickets, makes no difference in determining elasticity in Table 18.1.

Price elasticity of demand is determined by comparing the percentage change in price and the percentage change in quantity demanded. The percentage change in quantity will remain the same regardless of whether the difference is between 1 unit and 2 units or 1000 units and 2000 units.

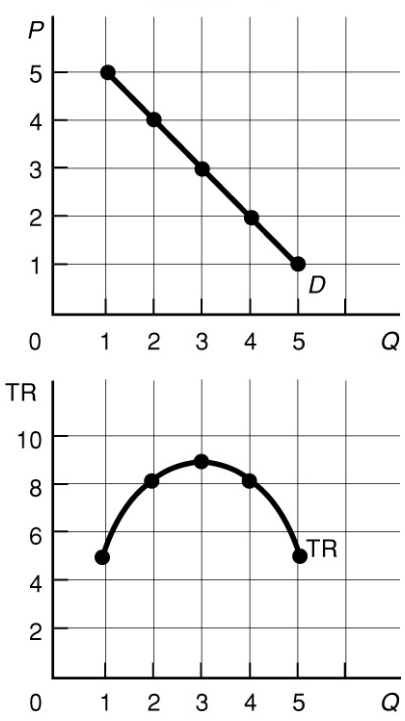
18-2 (*Key Question*) Graph the accompanying demand data, and then use the midpoint formula for E_d to determine price elasticity of demand for each of the four possible $1 price changes. What can you conclude about the relationship between the slope of a curve and its elasticity? Explain in a nontechnical way why demand is elastic in the northwest segment of the demand curve and inelastic in the southeast segment.

Product price	Quantity demanded
$5	1
4	2
3	3
2	4
1	5

See the graph accompanying the answer to 18-3. Elasticities, top to bottom: 3; 1.4; .714; .333. Slope does not measure elasticity. This demand curve has a constant slope of -1 (= -1/1), but elasticity declines as we move down the curve. When the initial price is high and initial quantity is low, a unit change in price is a *low* percentage while a unit change in quantity is a *high* percentage change. The percentage change in quantity exceeds the percentage change in price, making demand elastic. When the initial price is low and initial quantity is high, a unit change in price is a *high* percentage change while a unit change in quantity is a *low* percentage change. The percentage change in quantity is less than the percentage change in price, making demand inelastic.

18-3 (*Key Question*) Calculate total-revenue data from the demand schedule in question 2. Graph total revenue below your demand curve. Generalize about the relationship between price elasticity and total revenue.

See the graph. Total revenue data, top to bottom: $5; $8; $9; $8; $5. When demand is elastic, price and total revenue move in the opposite direction. When demand is inelastic, price and total revenue move in the same direction.



18-4 (*Key Question*) How would the following changes in price affect total revenue? That is, would total revenue increase, decline, or remain unchanged?

a. Price falls and demand is inelastic.

b. Price rises and demand is elastic.

c. Price rises and supply is elastic.

d. Price rises and supply is inelastic.

e. Price rises and demand is inelastic.

f. Price falls and demand is elastic.

g. Price falls and demand is of unit elasticity.

Total revenue would increase in (c), (d), (e), and (f); decrease in (a) and (b); and remain the same in (g).

18-5 (*Key Question*) What are the major determinants of price elasticity of demand? Use those determinants and your own reasoning in judging whether demand for each of the following products is probably elastic or inelastic:

(a) bottled water; (b) toothpaste; (c) Crest toothpaste; (d) ketchup; (e) diamond bracelets; (f) Microsoft Windows operating system.

Substitutability, proportion of income; luxury versus necessity, and time. Elastic: (a), (c), (e). Inelastic: (b), (d), and (f).

18-6 What effect would a rule stating that university students must live in university dormitories have on the price elasticity of demand for dormitory space? What impact might this in turn have on room rates?

The ruling would make the price elasticity of demand more inelastic than if there were no such rule, assuming that there is not another equivalent university nearby to which students could

transfer. Although universities are nonprofit organizations, the rule would certainly allow them to raise rates without worrying so much about students moving out to live elsewhere.

18-7 In November 1998 Vincent van Gogh's self-portrait sold at auction for $71.5 million. Portray this sale in a demand and supply diagram and comment on the elasticity of supply. Comedian George Carlin once mused, "If a painting can be forged well enough to fool some experts, why is the original so valuable?" Provide an answer.

The supply is perfectly inelastic—vertical—at a quantity of 1 unit. The $71.5 million price is determined where the downward sloping demand curve intersected this supply curve.

If more than one picture were available (all but one having to be a copy), the demand would likely decrease enormously.

18-8 (*Key Question*) What is the formula for measuring the price elasticity of supply? Suppose the price of apples goes up from $20 to $22 a box. In direct response, Goldsboro Farms supplies 1200 boxes of apples instead of 1000 boxes. Compute the coefficient of price elasticity (midpoints approach) for Goldsboro's supply. It its supply elastic, or is it inelastic?

E_S = percentage change in quantity supplied / percentage change in price.

Using the midpoint formula, $E_s = 1.91$ {= (200/[(1000+1200)/2] / 2/[(20+22)/2]}

Supply is price elastic ($E_s>1$).

18-9 (*Key Question*) Suppose the cross elasticity of demand for products A and B is +3.6 and for products C and D is -5.4. What can you conclude about how products A and B are related? Products C and D?

A and B are substitutes; C and D are complements.

18-10 (*Key Question*) The income elasticities of demand for movies, dental services, and clothing have been estimated to be +3.4, +1.0, and +0.5 respectively. Interpret these coefficients. What does it mean if the income elasticity coefficient is negative?

All are normal goods—income and quantity demanded move in the same direction. These coefficients reveal that a 1 percent increase in income will increase the quantity of movies demanded by 3.4 percent, of dental services by 1.0 percent, and of clothing by 0.5 percent. A negative coefficient indicates an inferior good—income and quantity demanded move in the opposite direction.

18-11 Research has found that an increase in the price of beer would reduce the amount of marijuana consumed. Is cross elasticity between the two products positive or negative? Are these products substitutes or complements? What might be the logic behind this relationship?

The cross elasticity of the two products is negative. The products appear to be complementary. As one drinks beer, one also smokes marijuana.

18-12 Refer to Table 18.5. If the six people listed in the table are the only consumers in the market and the equilibrium price is $11 (not the $8 shown), how much consumer surplus will the market generate?

The total consumer surplus will be $3 ($2 for Bob, $1 for Barb, $0 for Bill, and Bart, Brent, and Jenny will not purchase the good at a price of $11).

18-13 Refer to Table 18.6. If the six people listed in the table are the only producers in the market and the equilibrium price is $6 (not the $8 shown), how much producer surplus will the market generate?

The total producer surplus will be $6 ($3 for Carlos, $2 for Courtney, $1 for Chuck, $0 for Cindy, and Craig and Chad will not sell at a price of $6).

18-14 Draw a supply and demand graph and identify the areas of consumer and producer surplus. Given the demand curve, what impact will an increase in supply have on the amount of consumer surplus shown in your diagram? Explain why.

The graph will look like Figure 18.7 in the chapter. An increase in supply will lower the price and increase the amount of consumer surplus for a given demand curve. Any individual that was receiving consumer surplus before the change in supply will realize an increase in consumer surplus as the price falls and the difference between their maximum willingness to pay and the market price widens.

18-15 (*Key Question*) Use the ideas of consumer surplus and producer surplus to explain why economists say competitive markets are efficient. Why are below- or above-equilibrium levels of output inefficient, according to these two sets of ideas?

When the consumers' utility exceeds the price paid, consumer surplus is generated. Likewise, when producers receive a price greater than marginal cost, producer surplus is created. By producing up to the point where MB = MC, the maximum potential consumer surplus and producer surplus is generated. Producing less than the equilibrium level means that potential surplus is left unrealized. Overproduction subtracts from the surplus because society values the use of the additional resources in other pursuits more than it values them in consumption of that good.

18-16 (*Last Word*) What is the purpose of charging different groups of customers different prices? Supplement the three broad examples in the Last Word with two additional examples of your own. Hint: Think of price discounts based on group characteristic or time of purchase.

The primary purpose for charging different prices is to increase revenue and, in turn, profits. Other examples include student and senior citizen discounts (group characteristics based on age or activity), and movies and golf courses (discounts for consumption during "off-peak" times in order to spread out consumption and increase revenue).