ANSWERS TO END-OF-CHAPTER QUESTIONS

3-1 Explain the law of demand. Why does a demand curve slope downward? How is a market demand curve derived from individual demand curves?

As prices change because of a change in supply for a commodity, buyers will change the quantity they demand of that item. If the price drops, a larger quantity will be demanded. If the price rises, a lesser quantity will be demanded.

The demand curve slopes downward because of diminishing marginal utility, and the substitution and income effects. Because successive units of a good provide less additional utility than the previous units, buyers will only pay for these smaller amounts of utility if the price is lowered. When the price of a commodity decreases relative to that of substitutes, a buyer will substitute the now cheaper commodity for those whose prices have not changed. At the same time, the decreased price of the commodity under discussion will make the buyer wealthier in real terms. More can be bought of this commodity (as well as of others whose prices have not changed). Thus, the substitution and income effects reinforce each other: More will be bought of a normal (or superior) commodity as its price decreases. On a graph with price on the vertical axis and quantity on the horizontal, this is shown as a demand curve sloping downward from left to right.

The market demand curve is derived by horizontally summing the individual demand curves.

3-2 What are the determinants of demand? What happens to the demand curve when each of these determinants changes? Distinguish between a change in demand and a change in the quantity demanded, noting the cause(s) of each.

The fundamental determinant of demand is the price of the commodity under consideration: a change in price causes movement along the commodity's demand curve. This movement is called a change in quantity demanded. Decreased price leads to movement down the demand curve: There is an increase in quantity demanded. Increased price leads to movement up the demand curve: There is a decrease in quantity demanded.

In addition, there are determinants of demand, which are factors that may shift the demand curve, i.e., cause a "change in demand." These are the number of buyers, the tastes (or desire) of the buyers for the commodity, the income of the buyers, the changes in price of related commodities (substitutes and complements), and expectations of the buyers regarding the future price of the commodity under discussion.

The following will lead to increased demand: more buyers, greater desire for the commodity, higher incomes (assuming a normal good), lower incomes (assuming an inferior good), an increased price of substitutes, a decreased price of complements, and an expectation of higher future prices or incomes. This increased demand will show as a shift of the entire demand curve to the right.

The reverse of all the above will lead to decreased demand and will show as a shift of the entire demand curve to the left.

3-3 (*Key Question*) What effect will each of the following have on the demand for small automobiles such as the Mini Cooper and Smart car?

a. Small automobiles become more fashionable.

b. The price of large automobiles rises (with the price of small autos remaining the same).

c. Income declines and small autos are an inferior good.

d. Consumers anticipate the price of small autos will greatly come down in the near future.

e. The price of gasoline substantially drops.

Demand increases in (a), (b), and (c); decreases in (d). The last one (e) is ambiguous. As autos and gas are complements, one could argue that the decrease in gas prices would stimulate demand

for all cars, including small ones. However, one could also argue that small cars are attractive to consumers because of fuel efficiency, and that a decrease in gas prices effectively reduces the price of the "gas guzzling" substitutes. That would encourage consumers to switch from smaller to larger cars (SUVs), and demand for small automobiles would fall. [This presents a good illustration of the complexity of many of these changes.]

3-4 Explain the law of supply. Why does the supply curve slope upward? How is the market supply curve derived from the supply curves of individual producers?

As prices rise because of increased demand for a commodity, producers find it more and more profitable to increase the quantity they offer for sale; that is, the supply curve will slope upward from left to right. Clearly, firms would rather sell at a higher price than at a lower price. Moreover, it is necessary for firms to demand a higher price as they increase production. This comes about because as they produce more and more, they start to run up against capacity constraints and costs rise. At any given time, a plant has a given size. As production increases, the firm will need to add an extra shift and then a third shift, both perhaps at higher wages. It may run out of warehouse space and have to rent at higher cost from another firm. It may have to pay extra to get increasingly urgent raw material, and so on.

The market supply curve is derived by horizontally adding the individual supply curves.

3-5 What are the determinants of supply? What happens to the supply curve when each of these determinants changes? Distinguish between a change in supply and a change in the quantity supplied, noting the cause(s) of each.

The fundamental determinant of supply is the price of the commodity. As price increases, the quantity supplied increases. An increase in price causes a movement up a given supply curve. A decrease in price causes a movement down a given supply curve.

The non-price determinants of supply are: resource (input) prices, technology, taxes and subsidies, prices of other related goods, expectations, and the number of sellers. If one or more of these change, there will be a change in supply and the whole supply curve will shift to the right or the left.

The following will cause an increase in supply: a decrease in resource (input) prices; improved (lower cost) technology; a decrease in business taxes, an increase in subsidies to business; a decrease in the price of another commodity that this firm was making, provided that commodity is a substitute in production (the firm can switch from the now lower priced one to our commodity); an expectation of lower prices in the future; and an increase in the number of sellers. The increase in supply caused by the noted change in one or more of the above will cause the entire supply curve to shift to the right. More will now be supplied at any given price. Alternatively expressed, any given amount will now be supplied at a lower price.

The reverse of any or all the above changes in the determinants of demand will cause a decrease in demand and will be shown as a shift of the supply curve to the left. Less will now be supplied at any given price. Alternatively expressed, any given amount will now be supplied at a higher price.

3-6 (*Key Question*) What effect will each of the following have on the supply of automobile tires?

a. A technological advance in the methods of producing tires.

b. A decline in the number of firms in the tire industry.

c. An increase in the price of rubber used in the production of tires.

d. The expectation that the equilibrium price of auto tires will be lower in the future than it is currently.

e. A decline in the price of large tires used for semi-trucks and earth hauling rigs (with no change in the price of auto tires).

f. The levying of a per-unit tax in each auto tire sold.

g. The granting of a 50-cent-per-unit subsidy for each auto tire produced.

Supply increases in (a), (d), (e), and (g); decreases in (b), (c), and (f).

3-7 "In the corn market, demand often exceeds supply and supply sometimes exceeds demand." "The price of corn rises and falls in response to changes in supply and demand." In which of these two statements are the terms "supply" and "demand" used correctly? Explain.

In the first statement "supply" and "demand" are used incorrectly. Supply and demand are both schedules or curves that intersect where quantity supplied and quantity demanded are equal. One cannot talk of curves that intersect as exceeding or not exceeding each other.

Supply and/or demand can change (the entire curves can shift). Each time this happens, it will create a new intersection of the two curves that will lead to changes in the equilibrium quantity and price of corn. Thus, the terms "supply" and "demand" are used correctly in the second statement.

3-8 (*Key Question*) Suppose the total demand for wheat and the total supply of wheat per month in the Kansas City grain market are as follows:

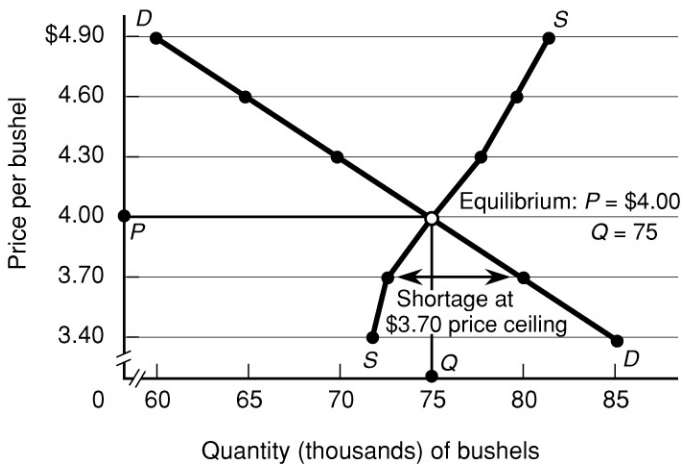
Thousands of bushels demanded	Price per bushel	Thousand of bushels supplied	Surplus (+) or shortage (-)
85	$3.40	72	_____
80	3.70	73	_____
75	4.00	75	_____
70	4.30	77	_____
65	4.60	79	_____
60	4.90	81	_____

a. What is the equilibrium price? What is the equilibrium quantity? Fill in the surplus-shortage column and use it to explain why your answers are correct.

b. Graph the demand for wheat and the supply of wheat. Be sure to label the axes of your graph correctly. Label equilibrium price *P* and the equilibrium quantity *Q*.

c. Why will $3.40 not be the equilibrium price in this market? Why not $4.90? "Surpluses drive prices up; shortages drive them down." Do you agree?

Data from top to bottom: -13; -7; 0; +7; +14; and +21.



(a) P_e = \$4.00; Q_e = 75,000. Equilibrium occurs where there is neither a shortage nor surplus of wheat. At the immediately lower price of \$3.70, there is a shortage of 7,000 bushels. At the immediately higher price of \$4.30, there is a surplus of 7,000 bushels. (See graph above).

(b) See graph above.

(c) Because at \$3.40 there will be a 13,000 bushel shortage which will drive price up. Because at \$4.90 there will be a 21,000 bushel surplus which will drive the price down. Quotation is incorrect; just the opposite is true.

3-9 (*Key Question*) How will each of the following changes in demand and/or supply affect equilibrium price and equilibrium quantity in a competitive market; that is do price and quantity rise, fall, remain unchanged, or are the answers indeterminate because they depend on the magnitudes of the shifts? Use supply and demand diagrams to verify your answers.

a. Supply decreases and demand is constant.

b. Demand decreases and supply is constant.

c. Supply increases and demand is constant.

d. Demand increases and supply increases.

e. Demand increases and supply is constant.

f. Supply increases and demand decreases.

g. Demand increases and supply decreases.

h. Demand decreases and supply decreases.

(a) Price up; quantity down;

(b) Price down; quantity down;

(c) Price down; quantity up;

(d) Price indeterminate; quantity up;

(e) Price up; quantity up;

(f) Price down; quantity indeterminate;

(g) Price up, quantity indeterminate;

(h) Price indeterminate and quantity down.

3-10 In 2001 an outbreak of foot-and-mouth disease in Europe led to the burning of millions of cattle carcasses. What impact do you think this had on the supply of cattle hides, hide prices, the supply of leather goods, and the price of leather goods?

The supply of cattle hides was reduced, raising the price of hides. Because hides were more expensive, it became more costly to produce leather, reducing the supply and raising the price of leather goods

3-11 Use two market diagrams to explain how an increase in state subsidies to public colleges might affect tuition and enrollments in both public and private colleges.

The state subsidies to public colleges shift the supply curve of the public colleges to the right, thus reducing tuition and increasing enrollments in these institutions. The decreased cost of public college education leads to some substitution away from the private colleges, where the enrollment demand curve shifts to the left. The final result is a lower cost of tuition in both public and private colleges. (See Figure 3.7c for the effect on public colleges, Figure 3.7b for the impact on private colleges.)

3-12 Critically evaluate: "In comparing the two equilibrium positions in Figure 3.7b, I note that a smaller amount is actually demanded at a lower price. This refutes the law of demand."

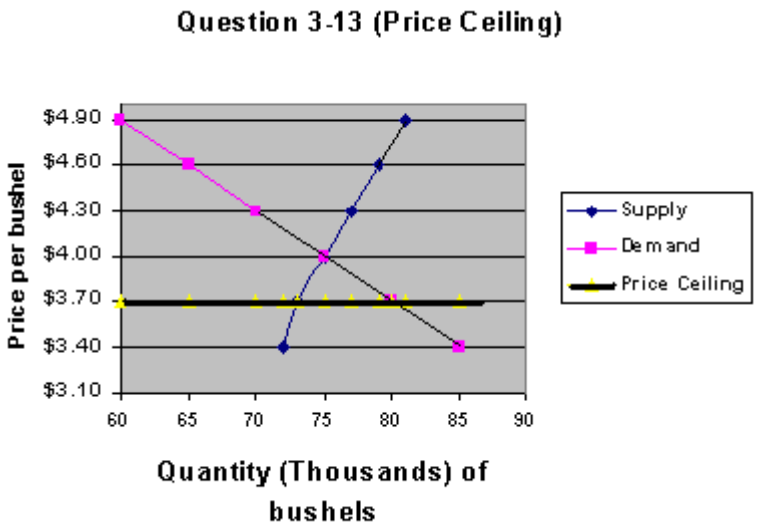
The key point here is that the second equilibrium occurs after demand has decreased, that is demand has shifted because of a change in determinants, which has caused buyers to want less at every price compared to the original D1 demand curve and schedule. Each equilibrium price refers to a different demand situation. Therefore, the fact that less is purchased at a lower price when demand decreases does not refute the law of demand. Note that on the second demand curve and schedule, less would still be purchased at a higher price.

3-13 For each stock in the stock market, the number of shares sold daily equals the number of shares purchased. That is, the quantity of each firm's shares demanded equals the quantity supplied. So, if this equality always occurs, why do the prices of stock shares ever change?

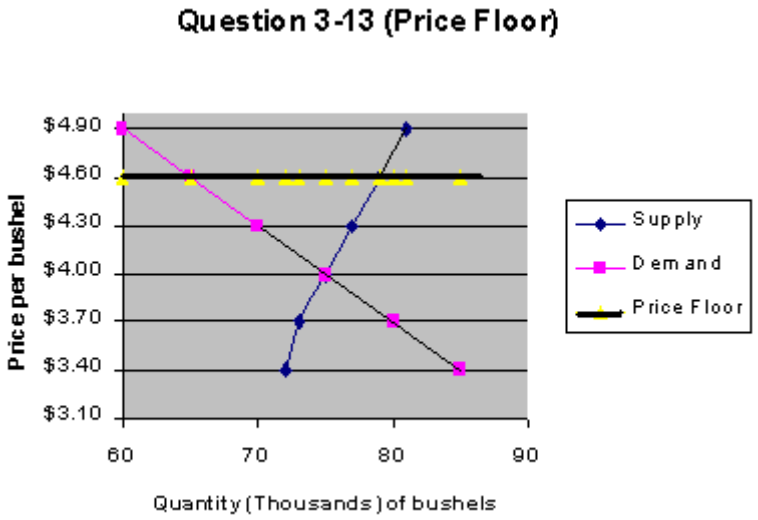
During any given stock trading session, there will be both prospective buyers and sellers, each willing to buy or sell a certain number of shares depending on price. If at the current price (e.g. the day's opening price) the quantity of shares demanded exceeds the quantity of shares supplied, buyers must increase their price offers to induce sellers to offer enough shares. This will cause share prices to rise until quantity demanded equals quantity supplied. Suppose that during the trading session there is a report of bad economic news. Sellers may respond by trying to sell more shares than buyers are wanting at the current price. In order to find enough willing buyers, sellers will have to offer their shares at lower prices. On any given trading day, there will be multiple equilibrium prices, many of them not lasting for more than a few minutes (or even seconds).

3-14 (*Key Question*) Refer to the table in question 8. Suppose that the government establishes a price ceiling of $3.70 for wheat. What might prompt the government to establish this price ceiling? Explain carefully the main effects. Demonstrate your answer graphically. Next, suppose that the government establishes a price floor of $4.60 for wheat. What will be the main effects of this price floor? Demonstrate your answer graphically.

At a price of $3.70, buyers will wish to purchase 80,000 bushels, but sellers will only offer 73,000 bushels to the market. The result is a shortage of 7,000 bushels. The ceiling prevents the price from rising to encourage greater production, discourage consumption, and relieve the shortage. See the graph below.



At a price of $4.60, buyers only want to purchase 65,000 bushels, but sellers want to sell 79,000 bushels, resulting in a surplus of 14,000 bushels. The floor prevents the price from falling to eliminate the surplus. See the graph below.



3-15 What do economists mean when they say that "price floors and ceilings stifle the rationing function of prices and distort resource allocation"?

When unrestrained, prices rise and fall to correct imbalances between the quantity supplied and quantity demanded in a market. If sellers find themselves at a given price with more output than consumers are willing to purchase, the price will fall. Likewise, if the market is not offering enough of a good to satisfy consumer demand, the price will rise. Price floors and ceilings prevent price movements to correct these imbalances. When a price is set above equilibrium (i.e. a price floor), sellers will produce more than the market can support, diverting resources away from more highly valued uses. Price ceilings result in an underallocation of resources toward a particular good, where the excess demand (shortage) reveals that consumers value the good (and therefore the resources used to produce it) more than what the market currently offers.

3-16 Advanced analysis: Assume that the demand for a commodity is represented by the equation $P = 10 - .2Qd$ and supply by the equation $P = 2 + .2Qs$, where Q_d and Q_S are quantity demanded and quantity supplied, respectively, and P is price. Using the equilibrium condition $Q_S = Q_d$, solve the equations to determine equilibrium price. Now determine equilibrium quantity. Graph the two equations to substantiate your answers.

Demand is $P = 10 - 2Q_d$

Therefore $5P = 50 - Q_d = 50 - 5P$

Supply is $P = 2 + 2Q_s$

Therefore $5P = 10 + Q_s$ and $Q_s = -10 + 5P$

Substitute Q_d and Q_s into $Q_s = Q_d$ equilibrium condition

$50 - 5P = -10 + 5P$

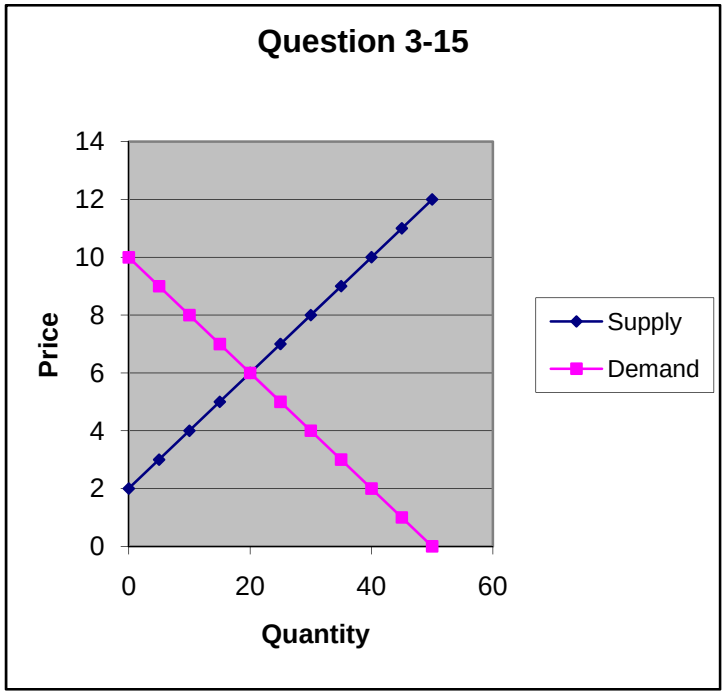
$60 = 10P$ and $6 = P$

Now substitute $P = 6$ in either Q_d or Q_s to determine equilibrium quantity

$Q_d = 50 - 5P = 50 - 5(6) = 20$

or

$Q_s = -10 + 5P = -10 + 5(6) = 20$



3-17 (*Last Word*) What is the current overall number of candidates waiting for an organ transplant? (For the answer, visit the United Network for Organ Sharing website, www.unos.org.) For what transplant organ is the waiting list the longest? (Select "Data" and "At a glance.") Do you favor the establishment of a legal market for transplant organs? Why or why not?

As of July 2006, there were nearly 99,000 on the waiting list, with kidneys having the longest list (about 71,000). Answers to the other questions will vary.