Chapter 3 Answers to End-of-Chapter Questions:

3-1 Explain the law of demand. Why does a demand curve slope downward? 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.

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 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. 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.

3-2 (Key Question) What effect will each of the following have on the demand for product B?
   a. Product B becomes more fashionable.
   b. The price of substitute product C falls.
   c. Income declines and product B becomes an inferior good.
   d. Consumers anticipate the price of B will be lower in the near future.
   e. The price of complementary product D falls.

Demand increases in (a), (c), and (e); decreases in (b) and (d).

3-3 Assess the effects of the terrorist attacks of September 11, 2001, and the war on terrorism on the demand for the following items in the United States: airline tickets, gasoline, hotel rooms, American flags, books about Afghanistan, and Arabic interpreters.
We would expect an increased demand for American flags, books about Afghanistan, and Arabic interpreters, and a decreased demand for airline tickets, gasoline, and hotel rooms.

3-4 Explain the law of supply. Why does the supply curve slope upward? 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.

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 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 nonprice 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.

3-5 (Key Question) What effect will each of the following have on the supply of product B?

a. A technological advance in the methods of producing B.
b. A decline in the number of firms in industry B.
c. An increase in the price of resources required in the production of B.
d. The expectation that the equilibrium price of B will be lower in the future than it is currently.
e. A decline in the price of product A, a good whose production requires substantially the same techniques as does the production of B.
f. The levying of a specific sales tax upon B.
g. The granting of a 50-cent per unit subsidy for each unit of B produced.

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

3-6 “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.

(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:

<table>
<thead>
<tr>
<th>Thousands of bushels demanded</th>
<th>Price per bushel</th>
<th>Thousands of bushels supplied</th>
<th>Surplus (+) or shortage (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>$3.40</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>3.70</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>4.00</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>4.30</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>4.60</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>4.90</td>
<td>81</td>
<td></td>
</tr>
</tbody>
</table>

a. What will be the market or 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 a 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 above.)

(b) Quantity (thousands) of bushels.

(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.
3-8 (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; quantity down.

3-9 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.

3-10 Explain: “Even though parking meters may yield little or no net revenue, they should nevertheless be retained because of the rationing function they perform.”

Even parking meters that charge, say, 25 cents an hour do perform a useful parking-spot-rationing function: When the hour is up, the car owner must either move the car or rush out to feed the meter to avoid getting a ticket. In this case it is not money or ration coupons that ration the parking space but the timing device on the meter.

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 3-6c for the effect on public colleges, Figure 3-6b for the impact on private colleges.)

3-12 Critically evaluate: “In comparing the two equilibrium positions in Figure 3-6a, I note that a larger amount is actually purchased at a higher price. This refutes the law of demand.”

The key point here is that the second equilibrium occurs after demand has increased, that is, demand has shifted because of a change in determinants, which has caused buyers to want more 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 more is purchased at a higher price when demand increases does not refute the law of demand. Note that on the second demand curve and schedule, more would still be purchased at a lower price.

3-13  
(Key Question) Refer to the table in question 7. 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.

**Question 3.13 (Price Ceiling)**

![Graph showing price ceiling](image)

Quantity (Thousands of bushels)

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.

**Question 3-13 (Price Floor)**

![Graph showing price floor](image)
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.

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 \( Qd \) and \( Qs \) are quantity demanded and quantity supplied, respectively, and \( P \) is price. Using the equilibrium condition \( Qs = Qd \), solve the equations to determine equilibrium price. Now determine equilibrium quantity. Graph the two equations to substantiate your answers.

Demand is \( P = 10 - 2Qd \)

Therefore \( 5P = 50 - Qd = 50 - 5P \)

Supply is \( P = 2 + 2Qs \)

Therefore \( 5P = 10 + Qs \), and \( Qs = -10 + 5P \)

Substitute \( Qd \) and \( Qs \) into \( Qs = Qd \) equilibrium condition

\( 50 - 5P = -10 + 5P \)

\( 60 = 10P \) and \( 6 = P \)

Now substitute \( P = 6 \) in either \( Qd \) or \( Qs \) to determine equilibrium quantity

\( Qd = 50 - 5P = 50 - 5(6) = 20 \)

or

\( Qs = -10 + 5P = -10 + 5(6) = 20 \)
Ticket scalping occurs in situations in which the original ticket price is set below the equilibrium price. This means that holders of tickets can find buyers who are willing to pay a higher price than that printed on the ticket. Basically, there is a shortage or the quantity demanded exceeds the quantity supplied at the original price. Some ticket holders are willing to part with their tickets by selling them at a higher price than the price they paid, and some buyers are willing to pay this higher price. In other words, both the buyers and sellers voluntarily enter into the “scalping” transaction because both expect to benefit. The buyers value the tickets more than the money, and the sellers value the money more than the tickets. The only losers in this case would be the sponsors of the event, who could have charged higher prices for the tickets originally. However, they don’t lose because of the scalping, but because they originally priced the tickets below equilibrium.