

Answers to the Problems – Chapter 3

1.
 - a. $\frac{1}{2}$ pound of wool trades for 1 pound of butter trades.
 - b. Butter is 40¢ a pound.
 - c. Yes, many people would accept Mr. Gregg's offer. People could use \$1.60 to buy 8 pounds of bacon. They could then trade this bacon with Mr. Gregg for 8 yards of cloth. Then they could trade the 8 yards of cloth for 1 bushel of salt. The salt could be sold for \$2.00, which would leave a profit of \$0.40.
2.
 - a. Bottled water and health club memberships are complements in consumption because people in health clubs drink a lot of bottled water.
 - b. French fries and baked potatoes are substitutes in consumption.
 - c. Leather purses and leather shoes are substitutes in production.
 - d. SUVs and pickup trucks are substitutes in consumption.
 - e. Diet coke and regular coke are substitutes in consumption and in production.
 - f. Low-fat milk and cream are complements in production.
3. The statement is false for several reasons. First, if the demand for Internet services increases and nothing else changes, the price of Internet service will rise *not* fall. Second, if the price of Internet services falls, the supply of Internet services does not change. Rather, there is a decrease in the quantity supplied, that is, a movement along the supply curve rather than a shift of the supply curve.
4.
 - a. The price of a recordable CD will rise, and the quantity of recordable CDs sold will increase.
Recordable CDs and MP3 downloads are substitutes. If the price of an MP3 download rises, people will buy more recordable CDs and fewer MP3 downloads. The demand for recordable CDs will increase. The price of a recordable CD will rise, and more recordable CDs will be sold.
 - b. The price of a recordable CD will fall, and fewer recordable CDs will be sold.
Recordable CDs and iPods are substitutes. If the price of an iPod falls, more iPods will be bought. The demand for recordable CDs will decrease. The price of a recordable CD will fall, and people will buy fewer recordable CDs.
 - c. The price of a recordable CD will rise and more recordable CDs will be sold.
CD players and recordable CDs are complements. The increase in the supply of CD players will lower the price of a CD player. With CD players cheaper than they were, some people will buy CD players. The demand for recordable CDs will increase. The price of a recordable CD will rise, and people will buy more recordable CDs.
 - d. The price of a recordable CD will rise, and the quantity sold will increase.
A recordable CD is a normal good. An increase in consumers' income will increase the demand for recordable CDs. As a result, the price of a recordable CD will rise and the quantity sold will increase.
 - e. The price of a recordable CD will rise, and the quantity sold will decrease.
If the workers who make recordable CDs get a pay raise, the cost of making a recordable CD increases and the supply of recordable CDs decreases. The price will rise, and people will buy fewer recordable CDs.
 - f. The price will rise but the quantity sold might decrease, increase, or stay the same.
Recordable CDs and MP3 downloads are substitutes. If the price of an MP3 download rises, fewer MP3 downloads will be bought and so the demand for recordable CDs will increase. The price of a recordable CD will rise and people will buy more recordable CDs.

If the wages paid to workers who make recordable CDs rise, the supply of recordable CDs decreases. The quantity of recordable CDs sold will decrease and the price of a recordable CD will rise. Taking the two events together, the price definitely rises, but the quantity sold might increase, decrease, or stay the same.

5. a. (ii) and (iii) and (iv)

The demand for gasoline will change if the price of a car changes, all speed limits on highways are abolished, or robot production cuts the cost of producing a car. If the price of a car rises, the quantity of cars bought decrease. So the demand for gasoline decreases. If all speed limits on highways are abolished, people will drive faster and use more gasoline. The demand for gasoline increases. If robot production plants lower the cost of producing a car, the supply of cars will increase. With no change in the demand for cars, the price of a car will fall and more cars will be bought. The demand for gasoline increases.
 - b. (i)

The supply of gasoline will change if the price of crude oil changes. If the price of crude oil rises, the cost of producing gasoline will rise. So the supply of gasoline decreases.
 - c. (i)

If the price of crude oil (a resource used to make gasoline) rises, the cost of producing gasoline will rise. So the supply of gasoline decreases. The demand for gasoline does not change, so the price of gasoline will rise and there is a movement up the demand curve for gasoline. The quantity demanded of gasoline decreases.
 - d. (ii) and (iii) and (iv)

If the price of a car rises, the quantity of cars bought decrease, so the demand for gasoline decreases. The supply of gasoline does not change. The price of gasoline falls and there is a movement down the supply curve of gasoline. The quantity supplied of gasoline decreases.

If all speed limits on highways are abolished, people will drive faster and use more gasoline. The demand for gasoline increases. The supply of gasoline does not change, so the price of gasoline rises and there is a movement up along the supply curve. The quantity supplied of gasoline increases.

If robot production plants lower the cost of producing a car, the supply of cars will increase. With no change in the demand for cars, the price of a car will fall and more cars will be bought. The demand for gasoline increases. The supply of gasoline does not change, so the price of gasoline rises and the quantity of gasoline supplied increases.
4. a. (i)

The demand for leather bags will increase when airfares halve. More people will plan on buying an air ticket and will also plan on buying a travel bag. Then demand for leather bags will increase.
 - b. (ii), (iii), and (iv)

The supply of leather will decrease when the price of beef falls. Cowhide (from which leather is made) is a complement in production of beef. If the price of beef falls, fewer cows will be slaughtered and less cowhide will be produced. The supply of leather decreases. The price of leather will rise and the supply of leather bags will decrease.

The producers of leather bags will switch to using the cheaper cloth. The supply of leather bags will decrease.

A new technology for cutting leather will lower the cost of making a leather bag and the increase the supply of leather bags.

- c. (ii), (iii), and (iv)
 When the supply of leather bags changes, there is a shift of the supply curve of leather bags and a movement along the demand curve of leather bags. The quantity demanded of leather bags will increase if the supply of leather bags increases and the quantity demanded of leather bags will decrease if the supply of leather bags decreases. So a fall in the price of beef and a new cheaper cloth for making bags will lead to a decrease in the quantity demanded of leather bags. A new technology increases the supply of leather bags and increases the quantity demanded of leather bags.
- d. (i)
 When the demand for leather bags changes, there is a shift of the demand curve and a movement along the supply curve. The quantity supplied of leather bags will increase when the demand for leather bags increases.
6. The demand curve is the curve that slopes down toward to the right. The supply curve is the curve that slopes up toward to the right. The equilibrium price is \$14 a pizza, and the equilibrium quantity is 200 pizzas a day.
- a. If the price of a pizza is \$16, there is a surplus of pizza; the quantity supplied of pizzas exceeds the quantity demanded. The surplus forces the price lower and the price falls to its equilibrium of \$14 a pizza.
- b. If the price of a pizza is \$12, there is a shortage of pizza; the quantity demanded of pizzas exceeds the quantity supplied. The shortage forces the price higher and the price rises to its equilibrium of \$14 a pizza.
7. a. The equilibrium price is 50 cents a pack, and the equilibrium quantity is 120 million packs a week.
 The price of a pack adjusts until the quantity demanded equals the quantity supplied. At 50 cents a pack, the quantity demanded is 120 million packs a week and the quantity supplied is 120 million packs a week.
- b. At 70 cents a pack, there will be a surplus of gum and the price will fall.
 At 70 cents a pack, the quantity demanded is 80 million packs a week and the quantity supplied is 160 million packs a week. There is a surplus of 80 million packs a week. The price will fall until market equilibrium is restored at a price of 50 cents a pack.
- c. At 30 cents a pack, there will be a shortage of gum and the price will rise.
 At 30 cents a pack, the quantity demanded is 160 million packs a week and the quantity supplied is 80 million packs a week. There is a shortage of 80 million packs a week. The price will rise until market equilibrium is restored at a price of 50 cents a pack.
- d. The supply curve has shifted leftward and there has been a movement along the demand curve. The new equilibrium price is 60 cents, and the equilibrium quantity is 100 million packs a week.
 As the number of gum-producing factories decreases, the supply of gum decreases. There is a new supply schedule, and the supply curve shifts leftward. Supply decreases by 40 million packs a week. That is, the quantity supplied at each price decreases by 40 million packs. The quantity supplied at 50 cents is now 80 million packs, and there is a shortage of gum. The price rises to 60 cents a pack, at which the quantity supplied equals the quantity demanded (100 million packs a week).
- e. The new price is 70 cents a pack, and the quantity is 120 million packs a week.
 The demand for gum increases, and the demand curve shifts rightward. The quantity demanded at each price increases by 40 million packs. Supply decreases by 40 million packs a week. That is, the quantity supplied at each price decreases by 40 million packs.

At any price below 70 cents a pack there is a shortage of gum. The price of gum will rise until the shortage is eliminated.

8. a. The equilibrium price is 65 cents a bag, and the equilibrium quantity is 145 million bags a week.
The price of a bag adjusts until the quantity demanded equals the quantity supplied. At 65 cents a bag, the quantity demanded is 145 million bags a week and the quantity supplied is 145 million bags a week.
- b. At 60 cents a bag, there will be a shortage of potato chips and the price will rise.
At 60 cents a bag, the quantity demanded is 150 million bags a week and the quantity supplied is 140 million bags a week. There is a shortage of 10 million bags a week. The price will rise until market equilibrium is restored—65 cents a bag.
- c. The demand curve has shifted rightward and there has been a movement along the supply curve. The new equilibrium price is 80 cents, and the equilibrium quantity is 160 million bags a week.
As the new dip comes onto the market, the demand for potato chips increases and the demand curve shifts rightward. Supply does not change, so the price rises along the supply curve. Demand increases by 30 million bags a week. That is, the quantity demanded at each price increases by 30 million bags. The quantity demanded at 65 cents is now 170 million bags a week of potato chips. The price rises to 80 cents a bag, at which the quantity supplied equals the quantity demanded (160 million bags a week).
- d. The new price is 100 cents a bag, and the quantity is 140 million bags a week.
The supply of potato chips decreases, and the supply curve shifts leftward. The quantity supplied at each price decreases by 40 million bags. The result of the new dip entering the market is a price of 80 cents a bag. At this price, there is now a shortage of potato chips. The price of potato chips will rise until the shortage is eliminated.

Critical Thinking

1. a. In reason number 1, the article drastically confuses “a change in demand,” that is, a shift of the demand curve, and “a change in the quantity demanded,” that is, a movement along the demand curve.
The article states that “a relatively strong U.S. economy continues to fuel strong demand for gasoline” and uses this fact as an apparent contradiction to “the economic textbooks” which say that “demand is supposed to go down [when prices go up].” There are two errors in these statements: First, the strong U.S. economy means that consumers’ incomes are rising, which increases the demand for gasoline and shifts the demand curve rightward. But this effect is very different than a decrease in the quantity of gasoline demanded when the price rises and so there is no contradiction between these two effects. Second, economic textbooks state that the “quantity demanded” decreases when the price rises; they do *not* state that the “demand” decreases then the price rises.
- b. Of the eight reasons, reasons 1 and 2, the strong U.S. economy and big vacation travel plans, increase the demand for gasoline.
The strong U.S. economy means that consumers’ incomes were growing, which increases the demand for normal goods, such as gasoline. Gasoline is a complement to vacation traveling by car, so an increase in vacation traveling increases the demand for gasoline.
- c. Of the eight reasons, reasons 3 through 8 decrease the demand for gasoline.
Reason 3, production interruptions, points out that some of the damage to refineries from hurricanes in 2005 has yet to be repaired. By damaging refineries, which are necessary to

produce gasoline, the hurricanes decreased the supply of gasoline. Reason 4, ethanol, points out that the higher price of ethanol decreases the supply of fuel, which raises the price at the pump. Reason 5, lower imports, points out that some U.S. gasoline is imported. If imports decrease, the supply of gasoline decreases. Reason 6, tight inventories, points out that the current supply cannot be increased by drawing down past inventories. In fact, the current supply of gasoline to consumers might be decreased as firms attempt to build up their inventories. Reason 7, future fears, points out that suppliers worry there might be supply disruptions in the future. Any supply disruption would decrease the supply of gasoline when it occurs. In addition, producers have a stronger incentive than otherwise to build their inventories in order to have gasoline on hand in case a supply disruption occurs. Building inventories decreases the current supply of gasoline to consumers. Finally, reason 8, mother nature, points out that hurricanes might again damage the infrastructure necessary to produce gasoline. Such damage would decrease the supply when it occurred. Additionally, this reason also gives producers a stronger incentive to build their inventories of gasoline, which decreases the current supply to consumers.

- d. We know that the demand increased more than the supply decreased because the equilibrium quantity of gasoline sold increased.
An increase in demand increases the equilibrium quantity. A decrease in supply decreases the equilibrium quantity. If, on net, the equilibrium quantity increases, then the magnitude of the increase in demand must be larger than the magnitude of the decrease in supply.
2.
 - a. While riding on the Eurostar passengers can watch a movie. As a result, the movie and the train travel are complements. Because the demand to watch the Da Vinci Code was high, the demand to travel on the Eurostar increased. The increase in demand to ride the Eurostar increased Eurostar's sales.
 - b. Travel by budget airlines is a substitute for travel by Eurostar. Fierce competition from budget airlines means that the budget airlines have lowered the price of their fares. This fall in the price of a substitute decreases the demand for travel by Eurostar. Taken by itself, this factor decreased Eurostar's sales.
 - c. The Da Vinci Code movie fans were tourists in Paris and so increased the demand for tourist activities.
The increase in tourists in Paris increased the demand for restaurant meals, increased the demand for lodging, and increased the demand for transportation within Paris.
3.
 - a. On the average, elderly people require more health care services than younger people. So the influx of older people into Las Vegas increased the demand for medical services and pharmaceutical drugs and services. Older people also eat out more often and do less yard work. So the demand for restaurant meals and yard care maintenance increased.
 - b. Older but not-yet retired people work and so the increase in "grannies" increased the supply of labor.

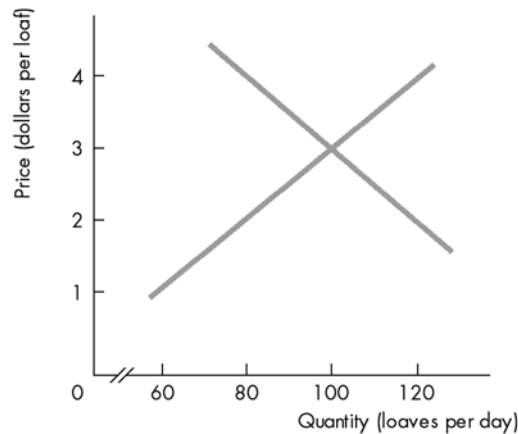
Web Activities

1.
 - a. Between 1985 and 2002, according to the FAO in their publication *The World Banana Economy, 1985-2002* (at <http://www.fao.org/docrep/007/y5102e/y5102e04.htm>) the quantity of desert bananas increased from 40,088,000 MT to 69,832,000 MT while the real U.S. retail price fell from \$1.13 per kg to \$0.95 per kg. The students' graphs should

- show the demand for and supply of bananas intersecting at their equilibrium price and quantity of bananas in 1985 and 2005.
- b. Likely both the demand and supply increased, but the increase in supply was larger than the increase in demand.
 - c. Most likely demand increased because bananas are a normal good and income generally increased over this period. The supply of bananas increased for two reasons. First, more acreage was cultivated, particularly in Ecuador. Second, significant technological advances have occurred in transporting bananas (better refrigeration) and in ripening bananas (the use of ethylene to trigger the ripening process).
2.
 - a. The price of oil has generally risen over the past five years.
 - b. When supply increases, the supply curve shifts rightward. The price falls. When supply decreases, the supply curve shifts leftward. The price rises.
 - c. If new drilling technology is developed, the supply of oil would increase and the supply curve would shift rightward. The price of oil would fall.
 - d. Energy produced using nuclear power is a substitute for energy produced using oil. If clean and safe nuclear technology is developed, the demand for oil would decrease and the demand curve would shift leftward. The price of oil would fall.
 - e. Alternative fuels are a substitute for oil. If most automobiles used alternative fuels, the demand for oil would decrease and the price of oil would fall.

Additional Problems

1. What is the effect on the price of hotdogs and the quantity of hotdogs sold if
 - a. The price of a hamburger rises?
 - b. The price of a hotdog bun rises?
 - c. The supply of hotdog sausages increases?
 - d. Consumers' incomes increase?
 - e. The wage rate of a hotdog seller increases?
 - f. If the wage rate of the hotdog seller rises and at the same time prices of ketchup, mustard, and relish fall?
2. Suppose that one of the following events occurs:
 - (i) The price of wool rises.
 - (ii) The price of sweaters falls.
 - (iii) A close substitute for wool is invented.
 - (iv) A new high-speed loom is invented.
 Which of the above events increases or decreases (state which),
 - a. The demand for wool?
 - b. The supply of wool?
 - c. The quantity of wool demanded?
 - d. The quantity of wool supplied?



3. The figure illustrates the market for bread.
 - a. Label the curves in the figure.
 - b. What are the equilibrium price of bread and the equilibrium quantity of bread?

4. The demand and supply schedules for potato chips are

Price (cents per bag)	Quantity demanded (millions of bags per week)	Quantity supplied
40	170	90
50	160	100
60	150	110
70	140	120
80	130	130
90	120	140
100	110	150
110	100	160

- a. What are the equilibrium price and equilibrium quantity of potato chips?
 - b. If chips were 60 cents a bag, describe the situation in the market for potato chips and explain what would happen to the price of a bag of chips.
5. In problem 4, suppose a new snack food comes onto the market and as a result the demand for potato chips decreases by 40 million bags per week.
- a. Has there been a shift in or a movement along the supply curve of chips?
 - b. Has there been a shift in or a movement along the demand curve for chips?
 - c. What is the new equilibrium price and quantity of chips?
6. In problem 5, suppose that a flood destroys several potato farms and as a result supply decreases by 20 million bags a week at the same time as the new snack food comes onto the market. What is the new equilibrium price and quantity of chips?

Solutions to Additional Problems

1.
 - a. The price of a hot dog rises, and the quantity of hot dogs sold increases. Hot dogs and hamburgers are substitutes. If the price of a hamburger rises, people buy more hot dogs and fewer hamburgers. The demand for hot dogs increases. The price of a hot dog rises, and more hot dogs are sold.
 - b. The price of a hot dog falls, and fewer hot dogs are sold. Hot dog buns and hot dogs are complements. If the price of a hot dog bun rises, fewer hot dog buns are bought. The demand for hot dogs decreases. The price of a hot dog falls, and people buy fewer hot dogs.
 - c. The price of a hot dog falls and more hot dogs are sold. The increase in the supply of hot dog sausages lowers the price of hot dog sausages. Hot dog sausages are a resource used in the production of hot dogs. With the lower priced resource, the supply of hot dogs increases. The price of a hot dog falls and people buy more hot dogs.
 - d. The price of a hot dog rises, and the quantity sold increases. An increase in consumers' income increases the demand for hot dogs. As a result, the price of a hot dog rises and the quantity bought increases.
 - e. The price of a hot dog rises, and the quantity sold decreases.

- If the wage of the hot dog seller increases, the cost of producing a hot dog increases and the supply of hot dogs decreases. The price rises, and people buy fewer hotdogs.
- f. The price of a hot dog rises, but the quantity might increase, decrease, or remain the same. Ketchup, mustard, and relish are complements of hot dogs. If the price of a ketchup, mustard, and relish fall, more ketchup, mustard, and relish are bought and the demand for hot dogs increases. The price of a hot dog rises, and people buy more hot dogs. If the wage of the hot dog seller increases, the cost of producing a hot dog increases and the supply of hot dogs decreases. The price rises, and people buy fewer hotdogs. Taking the two events together, the price of a hot dog rises, but the quantity might increase, decrease, or remain the same.
2. a. (ii) and (iii)
Wool is used in the production of sweaters. If the price of a sweater falls because the supply of sweaters has increased, then the equilibrium quantity of sweaters increases and the demand for wool increases. If the price of a sweater falls because the demand for sweaters has decreased, then the equilibrium quantity of sweaters decreases and the demand for wool decreases.
If a close substitute for wool is invented, some sweater producers will switch from wool to the substitute. When they do, the demand for wool decreases.
- b. (iv)
If a new high-speed loom is invented, the cost of making wool will fall and the supply of wool will increase.
- c. (i) and (iv)
If the price of wool rises there is a movement up along the demand curve. The quantity demanded of wool decreases.
If a new high-speed loom is invented, the cost of producing wool will fall. So the supply of wool increases. With no change in the demand for wool, the price of wool will fall and there is a movement down along the demand curve for wool. The quantity demanded of wool increases.
- d. (i), (ii), and (iii)
If the price of wool rises there is a movement up along the supply curve. The quantity supplied of wool increases.
If the price of a sweater falls because the supply of sweaters has increased, then the equilibrium quantity of sweaters increases and the demand for wool increases. With no change in the supply of wool, the price of wool rises and the quantity of wool supplied increases. If the price of a sweater falls because the demand for sweaters has increased, then the equilibrium quantity of sweaters decreases and the demand for wool decreases. With no change in the supply of wool, the price of wool falls and the quantity of wool supplied decreases.
If some sweater producers switch to using the new close substitute for wool, the demand for wool will decrease. With no change in the supply of wool, the price of wool falls and the quantity of wool supplied decreases.
3. a. The demand curve is the curve that slopes down toward to the right. The supply curve is the curve that slopes up toward to the right.
- b. The equilibrium price is \$3 a loaf, and the equilibrium quantity is 100 loaves a day. Market equilibrium is determined at the intersection of the demand curve and supply curve.

4.
 - a. The equilibrium price is 80 cents a bag, and the equilibrium quantity is 130 million bags a week.
The price of a bag adjusts until the quantity demanded equals the quantity supplied. At 80 cents a bag, the quantity demanded is 130 million bags a week and the quantity supplied is 130 million bags a week.
 - b. At 60 cents a bag, there will be a shortage of potato chips and the price will rise.
At 60 cents a bag, the quantity demanded is 150 million bags a week and the quantity supplied is 110 million bags a week. There is a shortage of 40 million bags a week. The price will rise until market equilibrium is restored—80 cents a bag.
5.
 - a. There has been a movement along the supply curve.
The demand for potato chips decreases, and the demand curve shifts leftward. Supply does not change, so the price falls along the supply curve.
 - b. The demand curve has shifted leftward.
As the new snack food comes onto the market, the demand for potato chips decreases. There is a new demand schedule, and the demand curve shifts leftward.
 - c. The equilibrium price is 60 cents, and the equilibrium quantity is 110 million bags a week.
Demand decreases by 40 million bags a week. That is, the quantity demanded at each price decreases by 40 million bags. The quantity demanded at 80 cents is now 90 million bags, and there is a surplus of potato chips. The price falls to 60 cents a bag, at which the quantity supplied equals the quantity demanded (110 million bags a week).
6. The new price is 70 cents a bag, and the quantity is 100 million bags a week.
The supply of potato chips decreases, and the supply curve shifts leftward. The quantity supplied at each price decreases by 20 million bags. The result of the new snack food entering the market is a price of 60 cents a bag. At this price, there is now a shortage of potato chips. The price of potato chips will rise until the shortage is eliminated.