Chapter 1: Answers to Questions and Problems

1.   Producer-producer rivalry best illustrates this situation. Here, Southwest is a producer attempting to steal customers away from other producers in the form of lower prices.

2.   The maximum you would be willing to pay for this asset is the present value, which is

$$PV = \frac{250{,}000}{(1 + 0.08)} + \frac{250{,}000}{(1 + 0.08)^2} + \frac{250{,}000}{(1 + 0.08)^3} + \frac{250{,}000}{(1 + 0.08)^4} + \frac{250{,}000}{(1 + 0.08)^5}$$
$$= \$998{,}177.51$$

3.
    a. Net benefits are $N(Q) = 20 + 24Q - 4Q^2$.
    b. Net benefits when $Q = 1$ are $N(1) = 20 + 24 - 4 = 40$ and when $Q = 5$ they are $N(5) = 20 + 24(5) - 4(5)^2 = 40$.
    c. Marginal net benefits are $MNB(Q) = 24 - 8Q$.
    d. Marginal net benefits when $Q = 1$ are $MNB(1) = 24 - 8(1) = 16$ and when $Q = 5$ they are $MNB(5) = 24 - 8(5) = $ -16.
    e. Setting $MNB(Q) = 24 - 8Q = 0$ and solving for Q, we see that net benefits are maximized when $Q = 3$.
    f. When net benefits are maximized at $Q = 3$, marginal net benefits are zero. That is, $MNB(3) = 24 - 8(3) = 0$.

4.
    a. The value of the firm before it pays out current dividends is

$$PV_{firm} = \$400{,}000 \left(\frac{1 + 0.06}{0.06 - 0.04} \right)$$

$$= \$21.2 \text{ million.}$$

    b. The value of the firm immediately after paying the dividend is

$$PV_{firm}^{Ex-Dividend} = \$400{,}000 \left(\frac{1 + 0.04}{0.06 - 0.04} \right)$$

$$= \$20.8 \text{ million.}$$

5.   The present value of the perpetual stream of cash flows. This is given by
$$PV_{Perpetuity} = \frac{CF}{i} = \frac{\$125}{0.05} = \$2{,}500$$

6.   The completed table looks like this:

Control Variable Q	Total Benefits B(Q)	Total Cost C(Q)	Net Benefits N(Q)	Marginal Benefit MB(Q)	Marginal Cost MC(Q)	Marginal Net Benefit MNB(Q)
100	1200	950	250	210	60	150
101	1400	1020	380	200	70	130
102	1590	1100	490	190	80	110
103	1770	1190	580	180	90	90
104	1940	1290	650	170	100	70
105	2100	1400	700	160	110	50
106	2250	1520	730	150	120	30
107	2390	1650	740	140	130	10
108	2520	1790	730	130	140	-10
109	2640	1940	700	120	150	-30
110	2750	2100	650	110	160	-50

   a. Net benefits are maximized at $Q = 107$.
   b. Marginal cost is slightly smaller than marginal benefit ($MC = 130$ and $MB = 140$). This is due to the discrete nature of the control variable.

7.
   a. The net present value of attending school is the present value of the benefits derived from attending school (including the stream of higher earnings and the value to you of the work environment and prestige that your education provides), minus the opportunity cost of attending school. As noted in the text, the opportunity cost of attending school is generally greater than the cost of books and tuition. It is rational for an individual to enroll in graduate when his or her net present value is greater than zero.
   b. Since this decreases the opportunity cost of getting an M.B.A., one would expect more students to apply for admission into M.B.A. Programs.

8.
   a. Her accounting profits are $170,000. These are computed as the difference between revenues ($200,000) and explicit costs ($30,000).
   b. By working as a painter, Jaynet gives up the $110,000 she could have earned under her next best alternative. This implicit cost of $110,000 is in addition to the $30,000 in explicit costs. Since her economic costs are $140,000, her economic profits are $200,000 - $140,000 = $60,000.

9.
   a. Total benefit when $Q = 2$ is B(2) $= 20(2) - 2*2^2 = 32$. When $Q = 10$, B(10) $=$
       $20(10) - 2*10^2 = 0$.
   b. Marginal benefit when $Q = 2$ is MB(2) $= 20 - 4(2) = 12$. When $Q = 10$, it is
       MB(10) $= 20 - 4(10) = $ -20.
   c. The level of Q that maximizes total benefits satisfies MB(Q) $= 20 - 4Q = 0$, so Q
       $= 5$.
   d. Total cost when $Q = 2$ is C(2) $= 4 + 2*2^2 = 12$. When $Q = 10$ C(Q) $= 4 + 2*10^2 =$
       204.
   e. Marginal cost when $Q = 2$ is MC(Q) $= 4(2) = 8$. When $Q = 10$ MC(Q) $= 4(10) =$
       40.
   f. The level of Q that minimizes total cost is MC(Q) $= 4Q = 0$, or $Q = 0$.
   g. Net benefits are maximized when MNB(Q) $=$ MB(Q) $=$ MC(Q) $= 0$, or $20 - 4Q -$
       $4Q = 0$. Some algebra leads to $Q = 20/8 = 2.5$ as the level of output that
       maximizes net benefits.

10.
   a. The present value of the stream of accounting profits is

$$PV = \frac{(120,000 - 40,000)}{1.05} + \frac{(120,000 - 40,000)}{(1.05)^2} + \frac{(120,000 - 40,000)}{(1.05)^3} = \$217,859.84$$

   b.   The present value of the stream of economic profits is

$$PV = \frac{(120,000 - 40,000 - 55,000)}{1.05} + \frac{(120,000 - 40,000 - 55,000)}{(1.05)^2}$$
$$+ \frac{(120,000 - 40,000 - 55,000)}{(1.05)^3} = \$68,081.20$$

11.   First, recall the equation for the value of a firm: $PV_{firm} = \pi_0 \left(\frac{1+i}{i-g}\right)$. Next, solve this
      equation for g to obtain $g = i - \frac{(1+i)\pi_0}{PV_{firm}}$. Substituting in the known values implies a
      growth rate of $= 0.09 - \frac{(1+0.09)11,000}{300,000} = 0.05$ or 5 percent. This would seem to be a
      reasonable rate of growth: $0.05 < 0.09$ $(g < i)$.

12.   Effectively, this question boils down to the question of whether it is a good investment to spend an extra $200 on a refrigerator that will save you $45 at the end of each year for five years. The net present value of this investment is

$$NPV = \frac{\$45}{1.06} + \frac{\$45}{(1.06)^2} + \frac{\$45}{(1.06)^3} + \frac{\$45}{(1.06)^4} + \frac{\$45}{(1.06)^5} - \$200$$

$$= \$189.56 - \$200$$

$$= -\$10.44.$$

You should buy the standard model, since doing so saves you $10.44 in present value terms.

13.   Under a flat hourly wage, employees have little incentive to work hard as working hard will not directly benefit them. This adversely affects the firm, since its profits will be lower than the $25,000 per store that is obtainable each day when employees perform at their peak. Under the proposed pay structure, employees have a strong incentive to increase effort, and this will benefit the firm. In particular, under the fixed hourly wage, an employee receives $160 per day whether he or she works hard or not. Under the new pay structure, an employee receives $330 per day if the store achieves its maximum possible daily profit and only $80 if the store's daily profit is zero. This provides employees an incentive to work hard and to exert peer pressure on employees who might otherwise goof off. By providing employees an incentive to earn extra money by working hard, both the firm and the employees will benefit.

14.
   a.   Accounting costs equal $145,000 per year in overhead and operating expenses. Her implicit cost is the $75,000 salary that must be given up to start the new business. Her opportunity cost includes both implicit and explicit costs: $145,000 + $75,000 = $220,000.
   b.   To earn positive accounting profits, the revenues per year should greater than $145,000. To earn positive economic profits, the revenues per year must be greater than $220,000.

15.   First, note that the $200 million spent to date is irrelevant. It is a sunk cost that will be lost regardless of the decision. The relevant question is whether the incremental benefits (the present value of the profits generated from the drug) exceed the incremental costs (the $60 million needed to keep the project alive). Since these costs and benefits span time, it is appropriate to compute the net present value. Here, the net present value of DAS's R&D initiative is

$$NPV = \frac{12{,}000{,}000}{(1+0.05)^5} + \frac{13{,}400{,}000}{(1+0.05)^6} + \frac{17{,}200{,}000}{(1+0.05)^7} + \frac{20{,}700{,}000}{(1+0.05)^8} + \frac{22{,}450{,}000}{(1+0.05)^9} - 60{,}000{,}00$$

$$= \$107{,}364.15$$

Since this is positive, DAS should spend the $60 million. Doing so adds over $100,000 to the firm's value.

16.   Disagree. In particular, the optimal strategy is the high advertising strategy. To see this, note that the present value of the profits from each advertising strategy are as follows:

$$PV_{High} = \frac{\$20{,}000{,}000}{(1+0.09)} + \frac{\$80{,}000{,}000}{(1+0.09)^2} + \frac{\$300{,}000{,}000}{(1+0.09)^3} = \$317{,}338{,}067.33$$

$$PV_{Mod} = \frac{\$40{,}000{,}000}{(1+0.09)} + \frac{\$80{,}000{,}000}{(1+0.09)^2} + \frac{\$135{,}000{,}000}{(1+0.09)^3} = \$208{,}276{,}416.98$$

$$PV_{Low} = \frac{\$75{,}000{,}000}{(1+0.09)} + \frac{\$110{,}000{,}000}{(1+0.09)^2} + \frac{\$118{,}000{,}000}{(1+0.09)^3} = \$252{,}509{,}789.36$$

Since the high advertising results in profit stream with the greatest present value, it is the best option.

17.
   a. Since the profits grow faster than the interest rate, the value of the firm would be infinite. This illustrates a limitation of using these simple formulas to estimate the value of a firm when the assumed growth rate is greater than the interest rate.
   b. $PV_{firm} = \pi \left[\frac{1+i}{i-g} \right] = \$3.2 \left[\frac{1.06}{0.04} \right] = \$84.8$ billion.
   c. $PV_{firm} = \pi \left[\frac{1+i}{i-g} \right] = \$3.2 \left[\frac{1.06}{0.06} \right] = \$56.5$ billion.
   d. $PV_{firm} = \pi \left[\frac{1+i}{i-g} \right] = \$3.2 \left[\frac{1.06}{0.10} \right] = \$33.9$ billion.

18.   If she invests $2,500 in pre-tax money each year in a traditional IRA, at the end of 4 years the taxable value of her traditional IRA will be

$$\$2,500(1.07)^4 + \$2,500(1.07)^3 + \$2,500(1.07)^2 + \$2,500(1.07) = \$11,876.85$$

She gets to keep only 81 percent of this (her tax rate is 19 percent), so her spendable income when she withdraws her funds at the end of 4 years is $(0.81)(\$11,876.85) = \$9,620.25$. In contrast, if she has $2,500 in pre-tax income to devote to investing in an IRA, she can only invest $2,025 in a Roth IRA each year (the remaining $475 must be paid to Uncle Sam). Since she doesn't have to pay taxes on her earnings, the value of her Roth IRA account at the end of 4 years represents her spendable income upon retirement if she uses a Roth IRA. This amount is

$$\$2,025(1.07)^4 + \$2,025(1.07)^3 + \$2,025(1.07)^2 + \$2,025(1.07) = \$9,620.25.$$

Notice that, ignoring set-up fees, the Roth and traditional IRAs result in exactly the same after-tax income at retirement. Therefore, she should adopt the plan with the lowest set-up fees. In this case, this means choosing the Roth IRA, thus avoiding the $50 set-up fee charged for the traditional IRA. In other words, the net present value of her after-tax retirement funds if she chooses a Roth IRA,

$$NPV_{Roth} = \frac{\$9,620.25}{(1.07)^4} - \$0 = \$7,339.24$$

is $50 higher than under a traditional IRA.

19.   Yes. To see this, first note that your direct and indirect costs are the same regardless of whether you adopt the project and therefore are irrelevant to your decision. In contrast, note that your revenues increase by $13,369,300 if you adopt the project. This change in revenues stemming from the adoption from the ad campaign represents your incremental revenues. To earn these additional revenues, however, you must spend an additional $2,860,050 in TV airtime and $1,141,870 for additional ad development labor. The sum of these costs – $4,001,920 – represents the explicit incremental cost of the new advertising campaign. In addition to these explicit costs, we must add $8,000,000 in implicit costs – the profits lost from foreign operations. Thus, based on the economically correct measure of costs – opportunity costs – the incremental cost of the new campaign is $12,001,920. Since these incremental costs are less than the incremental revenues of $13,369,300, you should proceed with the new advertising campaign. Going forward with the plan would increase the firm's bottom line by $1,367,380. Expressed differently, the extra accounting profits earned in the U. S. would offset the accounting profits lost from foreign operations.

20. Under the projected 2% annual growth rate, analysts would view the acquisition unfavorably since $PV_{firm} = \$39.60 \left(\frac{1+0.09}{0.09-0.02} \right) = \$616.63 < \$625.00$ (in millions). However, with an annual growth rate of 4% the acquisition is justified since $PV_{firm} = \$39.60 \left(\frac{1+0.09}{0.09-0.04} \right) = \$863.28 > \$625.00$ (in millions).

21. Producer-producer rivalry exists between U.S.-based shrimp producers (represented by the Southern Shrimp Alliance) and foreign shrimp producers. A consumer-producer rivalry exists between the members of the American Seafood Distributors Association and the U.S.-based shrimp producers (represented by the Southern Shrimp Alliance). Sustainability of profits in the U.S. shrimp market is questionable given the current circumstances. There are few low-cost alternatives to shrimp. Since Brazil's shrimp exports increased from 400 tons to more than 58,000 tons in just a few years indicates that it is relatively easy to enter the shrimp-farming industry. One result is that quantity of shrimp exported to the U.S. has dramatically increased, putting downward pressure on price. Both shrimp consumers, represented by American Seafood Distributor's Association, and shrimp producers, represented by the Southern Shrimp Alliance in the U.S. and by the governments of other countries, are well organized. The sustainability of profits in the U.S. market for shrimp will be determined by the relative success of buyers and sellers of shrimp at convincing the U.S. government of the merits for the 300 percent tariff request on shrimp entering the U.S.

22. Online price comparison sites are generally markets of intense producer-producer rivalry. Using the five forces framework, one would expect that profits in this industry would be low. Given that there are many sellers, products are identical across sellers, and that the main basis for competition is price, the industry rivalry would be very high and prices would be expected to be close to cost. Furthermore, barriers to entry are low, so that any profits would be competed away by new firms entering the market. Also, consumers have a variety of substitutes available, both for the products and the retail outlets from which they purchase. For these reasons, economic profits would likely be close to zero for The Local Electronics Shop.

23. While the incentive plan has been effective in increasing the sales for the dealership, it has not increased profitability. This is because the manager, who must approve all sales, gets paid a commission regardless of whether the sale is profitable for the dealership or not; she has an incentive to increase sales, not profits. A better incentive system would pay the manager a commission based on the amount of the profit on each sale. Doing this would give the sales manager an incentive to sell more cars and maintain high profit margins. In this way, the incentives of the manager are better aligned with the incentives of the dealership's owners. Many car dealerships pay the manager 20-30% of the gross profit, the difference between the selling price and the cost to the dealership.

Chapter 2: Answers to Questions and Problems

1.

    a. Since X is a normal good, a decrease in income will lead to a decrease in the demand for X (the demand curve for X will shift to the left).

    b. Since Y is an inferior good, an increase in income will lead to a decrease in the demand for good Y (the demand curve for Y will shift to the left).

    c. Since goods X and Y are substitutes, an increase in the price of good Y will lead to an increase in the demand for good X (the demand curve for X will shift to the right).

    d. No. The term "inferior good" does not mean "inferior quality," it simply means that income and consumption are inversely related.

2.

    a. The supply of good X will increase (shift to the right).

    b. The supply of good X will decrease. More specifically, the supply curve will shift vertically up by exactly \$3 at each level of output.

    c. The supply of good X will decrease. More specifically, the supply curve will rotate counter-clockwise.

    d. The supply curve for good X will increase (shift to the right).

3.

    a. $Q_x^s = -30 + 2(600) - 4(60) = 930$ units.

    b. Notice that although $Q_x^s = -30 + 2(80) - 4(60) = -110$, negative output is impossible. Thus, quantity supplied is zero.

    c. To find the supply function, insert $P_z = 60$ into the supply equation to obtain $Q_x^s = -30 + 2P_x - 4(60) = -270 + 2P_x$. Thus, the supply equation is $Q_x^s = -270 + 2P_x$. To obtain the inverse supply equation, simply solve this equation for P_x to obtain $P_x = 135 + 0.5Q_x^s$. The inverse supply function is graphed in Figure 2-1.
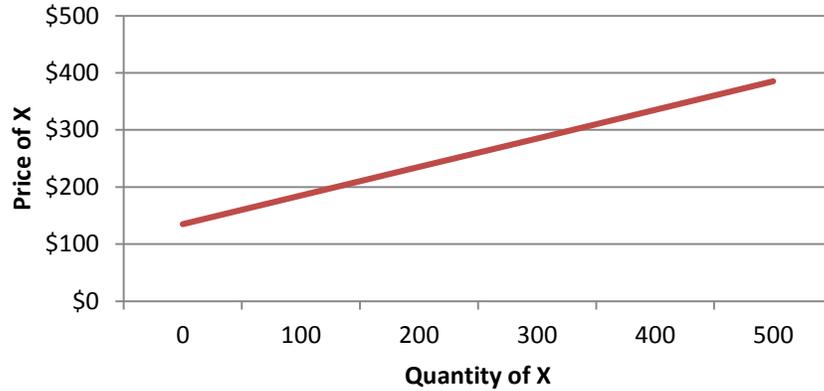
Figure 2-1

4.

    a. Good Y is a complement for X, while good Z is a substitute for X.

    b. X is a normal good.

    c. $Q_x^d = 6{,}000 - \frac{1}{2}(\$5{,}230) - \$6{,}500 + 9(\$100) + \frac{1}{10}(\$70{,}000) = 4{,}785$

    d. For the given income and prices of other goods, the demand function for good X
is $Q_x^d = 6{,}000 - \frac{1}{2}P_x - \$6{,}500 + 9(\$100) + \frac{1}{10}(\$70{,}000)$ which simplifies to
$Q_x^d = 7{,}400 - \frac{1}{2}P_x$. To find the inverse demand equation, solve for price to obtain
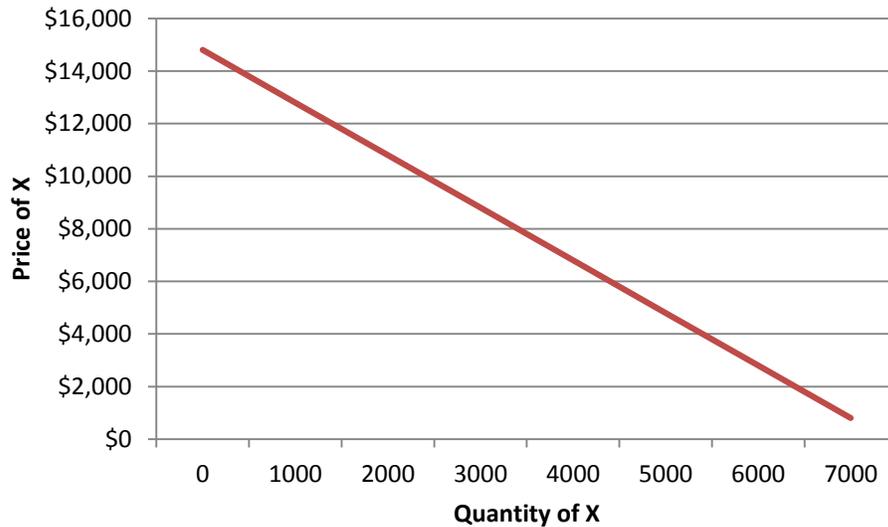$P_x = 14{,}800 - 2Q_x^d$. The demand function is graphed in Figure 2-2.

Figure 2-2

5.
   a. Solve the demand function for P_x to obtain the following inverse demand function: $P_x = 150 - \frac{1}{2}Q_x^d$.
   b. Notice that when $P_x = \$45$, $Q_x^d = 300 - 2(45) = 210$ units. Also, from part a, we know the vertical intercept of the inverse demand equation is 150. Thus, consumer surplus is $11,025 (computed as $(0.5)(\$150-\$45)210 = \$11,025$).
   c. When price decreases to $30, quantity demanded increases to 240 units, so consumer surplus increases to $14,400 (computed as $(0.5)(\$150-\$30)240 = \$14,400$).
   d. So long as the law of demand holds, a decrease in price leads to an increase in consumer surplus, and vice versa. In general, there is an inverse relationship between the price of a product and consumer surplus.

6.
   a. Equating quantity supplied and quantity demanded yields the equation $60 - P = P - 20$. Solving for P yields the equilibrium price of $40 per unit. Plugging this into the demand equation yields the equilibrium quanity of 20 units (since quantity demanded at the equilibrium price is $Q^d = 60 - (40) = 20$).
   b. A price floor of $50 is effective since it is above the equilibrium price of $40. As a result, quantity demanded will fall to 10 units ($Q^d = 60 - 50$), while quantity supplied will increase to 30 units ($Q^s = 50 - 20$). That is, firms produce 30 units but consumers are willing and able to purchase only 10 units. Therefore, at a price floor of $50, 10 units will be exchanged. Since $Q^d < Q^s$ there is a surplus amounting to 30-10 = 20 units.
   c. A price ceiling of $32 per unit is effective since it is below the equilibrium price of $40 per unit. As a result, quantity demanded will increase to 28 units ($Q^d = 60 - 32 = 28$), while quantity supplied will decrease to 12 units ($Q^s = 32 - 20 = 12$). That is, while firms are willing to produce only 12 units consumers want to buy 28 units at the ceiling price. Therefore, at the price ceiling of $32, only 12 units will be available to purchase. Since $Q^d > Q^s$, there is a shortage amounting to 28-12 = 16 units. Since only 12 units are available at a price of $32, the full economic price is the price such that quantity demanded equals the 12 available units: $12 = 60 - P^F$. Solving yields the full economic price of $48.

7.
   a. Equate quantity demanded and quantity supplied to obtain $14 - \frac{1}{2}P_x = \frac{1}{4}P_x - 1$. Solve this equation for P_x to obtain the equilibrium price of $P_x = 20$. The equilibrium quantity is 4 units (since at the equilibrium price quantity demanded is $Q^d = 14 - \frac{1}{2}(20) = 4$). The equilibrium is shown in Figure 2-3.
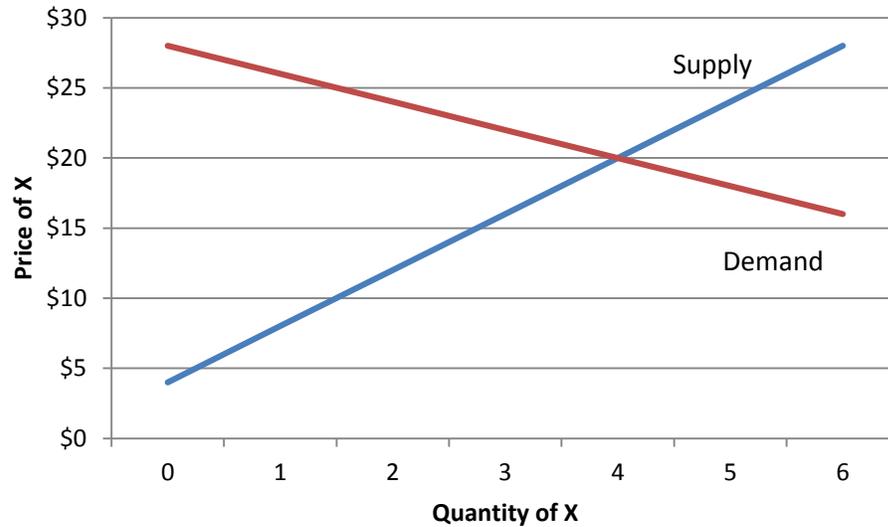
Figure 2-3

b. A \$12 excise tax shifts the supply curve up by the amount of the tax. Mathematically, this means that the intercept of the inverse supply function increases by \$12. Before the tax, the inverse supply function is $P = 4 + 4Q^s$. After the tax the inverse supply function is $P = 16 + 4Q^s$, and the after tax supply function (obtained by solving for Q^s in terms of P) is given by $Q^s = \frac{1}{4}P - 4$. Equating quantity demanded to after-tax quantity supplied yields $14 - \frac{1}{2}P = \frac{1}{4}P - 4$. Solving for P yields the new equilibrium price of \$24. Plugging this into the demand equation yields the new equilibrium quantity, which is 2 units.

c. Since two units are sold after the tax and the tax rate is \$12 per unit, total tax revenue is \$24.

8.

a. The shortage is 3 units (since at a price of \$6, $Q^d - Q^s = 4 - 1 = 3$ units). The full economic price is \$12.

b. The surplus is 1.5 units (since at a price of \$12, $Q^s - Q^d = 2.5 - 1 = 1.5$ units. The cost to the government is \$18 (computed as (\$12)(1.5) = \$18).

c. The excise tax shifts supply vertically by \$6. Thus, the new supply curve is S^1 and the equilibrium price increases to \$12. The price paid by consumers is \$12 per unit, while the amount received by producers is this \$12 minus the per unit tax. Thus, producers receive \$6 per unit. After the tax, the equilibrium quantity sold is 1 unit.

d. At the equilibrium price of \$10, consumer surplus is $.5(\$14 - \$10)2 = \$4$. Producer surplus is $.5(\$10 - \$2)2 = \$8$.

e. No. At a price of $2 no output is produced.

9.

    a. The inverse supply curve is $P = 26 + 0.05Q$.

    b. When Q_x = 400, producer surplus is (46-26)*400/2 = $4,000. When Q_x = 1200, producer surplus is (86-26)*1200/2 = $36,000.

10.

    a. The cost of purchasing the surplus is $40*(24-12) = $480.

    b. The deadweight loss resulting from a $40 price floor is $0.5 * (40 - 28) * (20 - 12) = 48.00.

11.   Rising input prices that increase production costs will lead to a leftward shift in the supply curve for RAM chips, resulting in a higher equilibrium price of RAM chips. If in addition, income falls, the demand for RAM chips will decrease since they are a normal good. This decrease in demand would tend to decrease the price of RAM chips. The ultimate effect of both of these changes in supply and demand on the equilibrium price of RAM chips is indeterminate. Depending on the relative magnitude of the decreases in supply and demand, the price you will pay for chips may rise or fall.

12.   The tariff reduces the supply of raw sugar, resulting in a higher equilibrium price of sugar. Since sugar is an input in making generic soft drinks, this increase in input prices will decrease the supply of generic soft drinks (putting upward pressure on the price of generic soft drinks and tend to reduce quantity). Coke and Pepsi's advertising campaign will decrease the demand for generic soft drinks (putting downward pressure on the price of generic soft drinks and further reducing the quantity). For these reasons, the equilibrium quantity of generic soft drinks sold will decrease. However, the equilibrium price may rise or fall, depending on the relative magnitude of the shifts in demand and supply.

13.   No. this confuses a change in demand with a change in quantity demanded. Higher cigarette prices will not reduce (shift to the left) the demand for cigarettes.

14.   To find the equilibrium price and quantity, equate quantity demanded and quantity supplied to obtain 210 – 1.5P = 2.5P – 150. Solving yields the new equilibrium price of $90 per pint. The equilibrium quantity is 75 units (since Q^d = 210 – 1.5*90 = 75