Chapter 1: Answers to Questions and Problems

1. Consumer-consumer rivalry best illustrates this situation. Here, Levi Strauss & Co. is a buyer competing against other bidders for the right to obtain the antique blue jeans.

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

$$PV = \frac{150,000}{(1+0.09)} + \frac{150,000}{(1+0.09)^2} + \frac{150,000}{(1+0.09)^3} + \frac{150,000}{(1+0.09)^4} + \frac{150,000}{(1+0.09)^5}$$
$$= \$583,447.69.$$

3.
   a. Net benefits are $N(Q) = 50 + 20Q - 5Q^2$.
   b. Net benefits when $Q = 1$ are $N(1) = 50 + 20 - 5 = 65$ and when $Q = 5$ they are $N(5) = 50 + 20(5) - 5(5)^2 = 25$.
   c. Marginal net benefits are $MNB(Q) = 20 - 10Q$.
   d. Marginal net benefits when $Q = 1$ are $MNB(1) = 20 - 10(1) = 10$ and when $Q = 5$ they are $MNB(5) = 20 - 10(5) = -30$.
   e. Setting $MNB(Q) = 20 - 10Q = 0$ and solving for Q, we see that net benefits are maximized when $Q = 2$.
   f. When net benefits are maximized at $Q = 2$, marginal net benefits are zero. That is, $MNB(2) = 20 - 10(2) = 0$.

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

   $$PV_{firm} = \$550,000\left(\frac{1+0.08}{0.08 - 0.05}\right).$$
   $$= \$19.8 \text{ million}$$

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

   $$PV_{firm}^{Ex-Dividend} = \$550,000\left(\frac{1+0.05}{0.08 - 0.05}\right).$$
   $$= \$19.25 \text{ million}$$

5. The present value of the perpetual stream of cash flows. This is given by

$$PV_{Perpetuity} = \frac{CF}{i} = \frac{\$75}{0.04} = \$1,875.$$

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	40	170
101	1400	1000	400	200	50	150
102	1590	1060	530	190	60	130
103	1770	1130	640	180	70	110
104	1940	1210	730	170	80	90
105	2100	1300	800	160	90	70
106	2250	1400	850	150	100	50
107	2390	1510	880	140	110	30
108	2520	1630	890	130	120	10
109	2640	1760	880	120	130	-10
110	2750	1900	850	110	140	-30

    a.   Net benefits are maximized at $Q = 108$.
    b.   Marginal cost is slightly smaller than marginal benefit $\left(MC = 120, MB = 130\right)$. 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 increases the opportunity cost of getting an M.B.A., one would expect fewer students to apply for admission into M.B.A. Programs.

8.
    a.   Her accounting profits are $180,000. These are computed as the difference between revenues ($200,000) and explicit costs ($20,000).
    b.   By working as a painter, Jaynet gives up the $100,000 she could have earned under her next best alternative. This implicit cost of $100,000 is in addition to the $20,000 in explicit costs. Since her economic costs are $120,000, her economic profits are $200,000 - $120,000 = $80,000.

9.

    a. Total benefit when $Q = 2$ is $B(2) = 25(2) - 2^2 = 46$. When

       $Q = 10$ $B(10) = 25(10) - 10^2 = 150$.

    b. Marginal benefit when $Q = 2$ is $MB(2) = 25 - 2(2) = 21$. When $Q = 10$ is

       $MB(2) = 25 - 2(10) = 5$.

    c. The level of Q that maximizes total benefits is $MB(Q) = 25 - 2Q = 0$, or

       $Q = 12.5$

    d. Total cost when $Q = 2$ is $C(2) = 5 + 2^2 = 9$. When $Q = 10$ $C(10) = 5 + 10^2 = 105$.

    e. Marginal cost when $Q = 2$ is $MC(Q) = 2(2) = 4$. When

       $Q = 10$ $MC(Q) = 2(10) = 20$.

    f. The level of Q that minimizes total cost is $MC(Q) = 2Q = 0$, or $Q = 0$.

    g. Net benefits are maximized when $MNB(Q) = MB(Q) - MC(Q) = 0$, or

       $25 - 2Q - (5 + 2Q) = 0$. Some algebra leads to $Q = 20/4 = 5$ as the level of

       output that maximizes net benefits.

10.

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

$$PV = \frac{(100,000 - 35,000)}{(1.04)} + \frac{(100,000 - 35,000)}{(1.04)^2} + \frac{(100,000 - 35,000)}{(1.04)^3} = \$180,380.90$$

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

$$PV = \frac{(100,000 - 35,000 - 50,000)}{(1.04)} + \frac{(100,000 - 35,000 - 50,000)}{(1.04)^2} + \frac{(100,000 - 35,000 - 50,000)}{(1.04)^3} = \$41,626.37$$

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 $g = 0.10 - \frac{(1 + 0.10)10,000}{275,000} = 0.06$, or 6 percent. This would seem to

be a reasonable rate of growth: $0.06 < 0.10 \, (g < i)$.

12. Effectively, this question boils down to the question of whether it is a good investment to spend an extra $100 on a refrigerator that will save you $25 at the end of each year for five years. The net present value of this investment is

$$NPV = \frac{\$25}{1.05} + \frac{\$25}{(1.05)^2} + \frac{\$25}{(1.05)^3} + \frac{\$25}{(1.05)^4} + \frac{\$25}{(1.05)^5} - \$100$$
$$= \$108.24 - \$100$$
$$= \$8.24.$$

You should buy the energy efficient model, since doing so saves you $8.24 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 $40,000 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 $144 per day whether he or she works hard or not. Under the new pay structure, an employee receives $264 per day if the store achieves its maximum possible daily profit and only $64 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 $3,160,000 per year in overhead and operating expenses. Her implicit cost is the $56,000 salary that must be given up to start the new business. Her opportunity cost includes both implicit and explicit costs: $3,160,000 + $56,000 = $3,216,000.
   b. To earn positive accounting profits, the revenues per year should greater than $3,160,000. To earn positive economic profits, the revenues per year must be greater than $3,216,000.

15. First, note that the $170 million spent to date is irrelevant, as it 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 $30 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

$$NPV = \frac{15,000,000}{(1+0.07)^5} + \frac{16,500,000}{(1+0.07)^6} + \frac{18,150,000}{(1+0.07)^7} + \frac{19,965,000}{(1+0.07)^8} + \frac{21,961,500}{(1+0.07)^9} - 30,000,000$$
$$= \$26,557,759.86.$$

Since this is positive, DAS should spend the $30 million. Doing so adds about $26.6 million 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:

$$PV_{High} = \frac{\$15,000,000}{(1+0.10)} + \frac{\$90,000,000}{(1+0.10)^2} + \frac{\$270,000,000}{(1+0.10)^3} = \$290,871,525.17;$$

$$PV_{Moderate} = \frac{\$30,000,000}{(1+0.10)} + \frac{\$75,000,000}{(1+0.10)^2} + \frac{\$150,000,000}{(1+0.10)^3} = \$201,953,418.48;$$

$$PV_{low} = \frac{\$70,000,000}{(1+0.10)} + \frac{\$105,000,000}{(1+0.10)^2} + \frac{\$126,000,000}{(1+0.10)^3} = \$245,078,888.10.$$

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. $PV_{firm} = \pi \left[\frac{1+i}{i-g} \right] = \$2.5 \left[\frac{1.08}{0.05} \right] = \$54 \text{ billion.}$

c. $PV_{firm} = \pi \left[\frac{1+i}{i-g} \right] = \$2.5 \left[\frac{1.08}{0.08} \right] = \$33.8 \text{ billion.}$

d. $PV_{firm} = \pi \left[\frac{1+i}{i-g} \right] = \$2.5 \left[\frac{1.08}{0.11} \right] = \$24.5 \text{ billion.}$

18.   If she invests $1,500 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

$$\$1,500(1.08)^4 + \$1,500(1.08)^3 + \$1,500(1.08)^2 + \$1,500(1.08)^1 = \$7,299.90.$$

She gets to keep only 83 percent of this (her tax rate is 17 percent), so her spendable income when she withdraws her funds at the end of 4 years is $(0.83)(\$7,299.90) = \$6,058.92$. In contrast, if she has $1,500 in pre-tax income to devote to investing in an IRA, she can only invest $1,245 in a Roth IRA each year (the remaining $255 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

$$\$1,245(1.08)^4 + \$1,245(1.08)^3 + \$1,245(1.08)^2 + \$1,245(1.08)^1 = \$6,058.92.$$

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 $25 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,

$$NPV_{Roth} = \frac{\$6,058.92}{(1.08)^4} - \$0 = \$4,453.49$$

is $25 higher than under a traditional IRA.

19.   No. Note first 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 $9,807,700 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 $2,945,700 in TV airtime and $1,179,100 for additional ad development labor. The sum of these costs – $4,124,800 – represents the explicit incremental cost of the new advertising campaign. In addition to these explicit costs, we must add $6,000,000 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 $10,124,800. Since these incremental costs exceed the incremental revenues of $9,807,700, you should not proceed with the new advertising campaign. Going forward with the plan would reduce the firm's bottom line by $317,100. Expressed differently, the extra accounting profits earned in the U. S. would not offset the accounting profits lost from foreign operations.

20. Under the projected 1% annual growth rate, analysts would view the acquisition unfavorably since $PV_{firm} = \$50.72\left(\dfrac{1+0.10}{0.10-0.01}\right) = \$619.91 < \$625.00$ (in millions).

    However, with an annual growth rate of 3% the acquisition is justified since

    $$PV_{firm} = \$50.72\left(\dfrac{1+0.10}{0.10-0.03}\right) = \$797.03 > \$625.00 \text{ (in millions)}.$$

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 salespeople 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.