Answers to Back-of-Chapter Problems

Chapter 1

1. Managerial economics is the analysis of important management decisions using the tools of economics. Most business decisions are motivated by the goal of maximizing the firm's profit. The tools of managerial economics provide a guide to profit-maximizing decisions.

2. i) **Multinational Production and Pricing.** The global automobile company needs information on demand (how many vehicles can be sold in each market at different prices) and production costs.

ii) **Market Entry.** Barnes and Noble and Borders not only need information on local market demand, they also need information on the ability and willingness of the other company to compete. This means gathering information on the rival's cost structure, sources of supply, access to capital, etc.

iii) **Building a New Bridge.** The authority should estimate usage of the bridge over its useful life, the likely cost of building and maintaining the bridge, and other important side-effects, pro and con -- including positive effects on business activity and the impacts on air pollution and traffic congestion.

iv) **A Regulatory Problem.** Before deciding whether to promote the oil-to-coal conversion, government regulators need information on how much oil would be saved (and the dollar value of savings) and the cost of the chain of side-effects -- not only the direct cost of electricity provision but also pollution costs and environmental damage.

v) **Oil Exploration**. Some of the information BP needs – such as current oil prices, rig worker wages, and other operating costs – is readily available. Other information—such as data gleaned from geological surveys, seismic tests, safety audits; wear and tear on drilling components; short-term and long-term weather conditions; the outlook concerning the global demand for oil – is probabilistic in nature.

vi) **An R&D Decision.** The pharmaceutical company should quiz its scientists on the chances of success (and the timetable for completion) for each R&D approach. The company's marketing department would supply estimates of possible revenues from the drug; its production department would estimate possible costs.

vii) **David Letterman.** Dave must carefully assess what he wants from a new contract (in particular how much he values the earlier time slot). As the negotiations unfold, Dave will glean valuable information as to the current competing offers of CBS and NBC. Of course, Dave must also try to assess how far the two networks might be willing to go in sweetening their offers.

3. The six steps might lead the soft-drink firm to consider the following questions. Step 1: What is the context? Is this the firm's first such soft drink? Will it be first to the marketplace, or is it imitating a competitor? Step 2: What is the profit potential for such a drink? Would the drink achieve other objectives? Is the fruit drink complementary to the firm's other products? Would it enhance the firm's image? Step 3: Which of six versions of the drink should the firm introduce? When (now or later) and where (regionally, nationally, or internationally) should it introduce the drink? What is an appropriate advertising and promotion policy? Step 4: What are the firm's profit forecasts for the drink in its first, second, and third years? What are the chances that the drink will be a failure after 15 months? Should the firm test market the drink before launching it? Step 5: Based on the answers to the questions in Steps 1 through 4, what is the firm's most profitable course of action? Step 6: In light of expected (or unexpected) developments in the first year of the launch, how should the firm modify its course of action?

4. Decision vignettes

a. A couple who buy the first house they view have probably sampled too few houses. Housing markets are notoriously imperfect. Houses come in various shapes, sizes, conditions, neighborhoods, and prices. Personal preferences for houses also vary enormously. The couple is likely to get a "better" house for themselves if they view a

dozen, two dozen, or more houses over the course of time before buying their "most-preferred" house from the lot. Circumstances justifying the first-house purchase include: (1) the house is so good that viewing others is a waste of time, (2) the house is so good and the commitment must be made now or another buyer will claim the house, (3) the couple must buy now (a job transfer has brought them to the area and schools open tomorrow), (4) they already have full information about the types of other houses available (the wife's best friend is a real estate agent).

b. The company seems to be launching the product to avoid "wasting" the $6 million already spent in development. This "sunk" cost is irrelevant and should be ignored. What does matter for the reinvestment decision are the future revenues and costs of continuing. (Reinvest if the net present value of future profits is positive.) Some "close-to-home" examples of the sunk cost fallacy: i) A fellow pays $250 for a year-long tennis membership but develops severe tennis elbow after two months. He continues to play in great pain in order to get his money's worth. ii) Ms. K has a subscription to a series of six plays for $150. She braves a snow storm so as not to waste the $25 cost. On reflection, she admits that she wouldn't have gone had she been given the ticket for free.

c. It's in the individual motorist's best interest to drive on. (Stopping is risky and inconvenient). But it's in the collective interest of all the delayed motorists to have someone stop and move the mattress. Here's an example of the potential conflict between private and public interests (between private profit and social welfare). In such circumstances, there is a potential role for government intervention.

d. Allowing the use of thalidomide had a disastrous outcome and more importantly was a bad decision (besides its potential risk, the drug was of questionable benefit in aiding sleep). The thalidomide disaster prompted a much tougher stance toward prior drug testing in the U.S. and elsewhere.

e. The frantic couple should choose separate lines to take advantage of whichever line is quicker. Whoever gets served first should check the baggage. The lesson here: DIVERSIFY.

f. To the extent that his actions and behavior were responsible for his marriage breakup, the CEO's mistake was to lose sight of the most important objective.

g. The cost per life saved is $400,000/20 = $20,000 for the ambulance service. It is $1,200,000/40 = $30,000 for the highway program. Based on these *average* measures, its seems strange that the ambulance budget is being cut and the highway budget expanded. However, the real issue is the impact on lives saved from budget changes *at the margin.* Perhaps, the ambulance budget has a lot of administrative "fat" in it. It could be cut by 40% with very little impact on lives. By the same token, a modest budget increase for highways might have a large impact on additional lives saved. In short, the average cost per life may not tell the real story.

h. FEMA's prediction of the potential hurricane risk to New Orleans was timely and prescient. However, the warning was not emphasized by the agency and certainly not heeded by federal, state, or local policy makers. The decision error was a combination of inattention, wishful thinking, and denial.

i. According to the counts of pros and cons, the individual prefers: Home over Beach, Beach over Mountains, *but* Mountains over Home. We have a cycle (i.e. intransitive preferences). The individual is left going around in circles. The obvious way out of this dilemma is to "score" each alternative by weighting the individual attributes. The more important the attribute, then the greater is the weight. In addition, the individual could use a broader scale (1 to 10) for each attribute as a way of measuring relative strength of preferences between alternatives. (For a related example, see Problem 4.4. In this context, the instructor may also wish to discuss voting cycles and the Condorcet paradox).

j. Compared to these extreme outcomes (abject surrender to terrorism or being a global policeman) any option looks good. This is hardly an even-handed portrayal. The real question is whether the implementing increased security measures that sacrifice civil liberties is better than other *relevant* alternatives.

Chapter 2

1. This statement confuses the use of average values and marginal values. The proper statement is that output should be expanded so long as marginal revenue exceeds marginal cost. Clearly, average revenue is not the same as marginal revenue, nor is average cost identical to marginal cost. Indeed, if management followed the average-revenue/average-cost rule, it would expand output to the point where AR = AC, in which case it is making zero profit per unit and, therefore, zero total profit!

2. The revenue function is $R = 170Q - 20Q^2$. Maximizing revenue means setting marginal revenue equal to zero. Marginal revenue is: $MR = dR/dQ = 170 - 40Q$. Setting $170 - 40Q = 0$ implies $Q = 4.25$ lots. By contrast, profit is maximized by expanding output only to $Q = 3.3$ lots. Although the firm can increase its revenue by expanding output from 3.3 to 4.5 lots, it sacrifices profit by doing so (since the extra revenue gained falls short of the extra cost incurred.)

3. In planning for a smaller enrollment, the college would look to answer many of the following questions: How large is the expected decline in enrollment? (Can marketing measures be taken to counteract the drop?) How does this decline translate into lower tuition revenue (and perhaps lower alumni donations)? How should the college plan its downsizing? Via cuts in faculty and administration? Reduced spending on buildings, labs, and books? Less scholarship aid? How great would be the resulting cost savings? Can the college become smaller (as it must) without compromising academic excellence?

4. a. $\pi = PQ - C = (120 - .5Q)Q - (420 + 60Q + Q^2) = -420 + 60Q - 1.5Q^2$.
Therefore, $M\pi = d\pi/dQ = 60 - 3Q = 0$. Solving yields $Q^* = 20$. Alternatively, $R = PQ = (120 - .5Q)Q = 120Q - .5Q^2$. Therefore, $MR = 120 - Q$. In turn, $C = -420 + 60Q + Q^2$, implying: $MC = 60 + 2Q$. Equating marginal revenue and marginal cost yields: $120 - Q = 60 + 2Q$, or $Q^* = 20$.

b. Here, $R = 120Q$; it follows that $MR = 120$. Equating MR and MC yields: $120 = 60 + 2Q$, or $Q^* = 30$.

5. a. The firm exactly breaks even at the quantity Q such that $\pi = 120Q - [420 + 60Q] = 0$. Solving for Q, we find $60Q = 420$ or $Q = 7$ units.

b. In the general case, we set: $\pi = PQ - [F + cQ] = 0$. Solving for Q, we have: $(P - c)Q = F$ or $Q = F/(P - c)$. This formula makes intuitive sense. The firm earns a margin (or contribution) of $(P - c)$ on each unit sold. Dividing this margin into the fixed cost reveals the number of units needed to exactly cover the firm's total fixed costs.

c. Here, MR = 120 and MC = dC/dQ = 60. Because MR and MC are both constant and distinct, it is impossible to equate them. The modified rule is to expand output as far as possible (up to capacity), because MR > MC.

6. a. If DVDs are given away (P = $0), demand is predicted to be: Q = 1600 - (200)(0) = 1,600 units. At this output, firm A's cost is: 1,200 + (2)(1,600) =$4,400, and firm B's cost is: (4)(1,600) = $6,400. Firm A is the cheaper option and should be chosen. (In fact, firm A is cheaper as long as Q > 600.)

b. To maximize profit, we simply set MR = MC for each supplier and compare the maximum profit attainable from each. We know that MR = 8 - Q/100 and the marginal costs are $MC_A = 2$ and $MC_B = 4$. Thus, for firm A, we find: $8 - Q_A/100 = 2$, and so $Q_A = 600$ and $P_A = \$5$ (from the price equation). For firm B, we find $Q_B = 400$ and $P_B = \$6$. With Firm A, the station's profit is: 3,000 - [1,200 + (2)(600)] = $600. With Firm B, its profit is 2,400 - 1,600 = $800. Thus, an order of 400 DVDs from firm B (priced at $6 each) is optimal.

7. a. The marginal cost per book is MC = 40 + 10 = $50. (The marketing costs are fixed, so the $10 figure mentioned is an average fixed cost per book.) Setting MR = MC, we find MR = 150 – 2Q = 50, implying Q* = 50 thousand books. In turn, P* = 150 –50 = $100 per book.

b. When the rival publisher raises its price dramatically, the firm's demand curve shifts upward and to the right. The new intersection of MR and MC now occurs at a greater

output. Thus, it is incorrect to try to maintain sales via a full $15 price hike. For instance, in the case of a parallel upward shift, P = 165 – Q. Setting MR = MC, we find: MR = 165 – 2Q = 50, implying Q* = 57.5 thousand books, and in turn, P* = 165 – 57.5 = $107.50 per book. Here, OS should increase its price by only $7.50 (not $15).

c. By using an outside printer, OS is saving on fixed costs but is incurring a higher marginal cost (i.e., printing cost) per book. With a higher marginal cost, the intersection of MR and MC occurs at a lower optimal quantity. OS should reduce its targeted sales quantity of the text and raise the price it charges per book. Presumably, the fixed cost savings outweighs the variable cost increase.

8. The fall in revenue from waiting each additional month is MR = dR/dt = -8. The reduction in cost of a month's delay is MC = dC/dt = -20 + .5t. The optimal introduction date is found by equating MR and MC: -8 = -20 + .5t, which implies .5t = 12 or t* = 24 months. The marketing manager's 12-month target is too early. Delaying 12 more months sacrifices revenue but more than compensates in reduced costs.

9. a. The MC per passenger is $20. Setting MR = MC, we find 120 - .2Q = 20, so Q = 500 passengers (carried by 5 planes). The fare is $70 and the airline's weekly profit is: $35,000 - 10,000 = $25,000.

b. If it carries the freight, the airline can fly only 4 passenger flights, or 400 passengers. At this lower volume of traffic, it can raise its ticket price to P = $80. Its total revenue is (80)(400) + 4,000 = $36,000. Since this is greater than its previous revenue ($35,000) and its costs are the same, the airline should sign the freight agreement.

10. The latter view is correct. The additional post-sale revenues increase MR, effectively shifting the MR curve up and to the right. The new intersection of MR and MC occurs at a higher output, which, in turn, implies a cut in price. (Of course, one must discount the additional profit from service and supplies to take into account the time value of money.)

11. $\pi = -423 + 10.4P - .05P^2$ implies $M\pi = 10.4 - .1P$. Setting $M\pi = 0$, we obtain: $10.4 - .1P = 0$, or P = \$104 thousand. This is exactly the optimal price found earlier.

12. a. First note that if marginal cost and marginal benefit to consumers both increased by \$25, the optimal output would not change since MR(Q*) = MC(Q*) implies that MR(Q*) + 25 = MC(Q*) + 25. The price would rise by \$25 but, since marginal costs rise by \$25, the firm's total profits would remain the same. If marginal costs increased by more than \$25, profits would fall. Thus the firm should not redesign when the increase in MC is \$30.

b. If MC increases by \$15 and MR increases by \$25, the new intersection of the MR and MC occurs at a greater output. Output, price, and profit would all rise. Price, however, would rise by less than \$25.

13. Setting MR = MC, one has: $a - 2bQ = c$, so that $Q = (a - c)/2b$. We substitute this expression into the price equation to obtain:

$$P = a - b[(a - c)/2b] = a - (a - c)/2 = a/2 + c/2 = (a + c)/2.$$

The firm's optimal quantity increases after a favorable shift in demand – either an increase in the intercept (a) or a fall in the slope (b). But quantity decreases if it becomes more costly to produce extra units, that is., if the marginal cost (c) increases. Price is raised after a favorable demand shift (an increase in a) or after an increase in marginal cost (c). Note that only \$.50 of each dollar of cost increase is passed on to the consumer in the form of a higher price.

*14. The Burger Queen (BQ) facts are P = 3 - Q/800 and MC = \$.80.

a. Set MR = 0 to find BQ's revenue-maximizing Q and P. Thus, we have 3 - Q/400 = 0, so Q = 1,200 and P = \$1.50. Total revenue is \$1,800 and BQ's share is 20% or \$360. The franchise owner's revenue is \$1,440, its costs are (.8)(1,200) = \$960, so its profit is \$480.

b. The franchise owner maximizes its profit by setting MR = MC. Note that the relevant MR is (.8)(3 - Q/400) = 2.4 - Q/500. After setting MR = .80, we find Q = 800. In turn, P = $2.00 and the parties' total profit is (2.00 - .80)(800) = $960, which is considerably larger than $840, the total profit in part (a).

c. Regardless of the exact split, both parties have an interest in maximizing total profit, and this is done by setting (full) MR equal to MC. Thus, we have 3 - Q/400 = .80, so that Q = 880. In turn, P = $1.90, and total profit is: (1.90 - .80)(880) = $968.

d. The chief disadvantage of profit sharing is that it is difficult, time-consuming, and expensive for the parent company to *monitor* the reported profits of the numerous franchises. Revenue is relatively easy to check (from the cash register receipts) but costs are another matter. Individual franchisees have an incentive to exaggerate the costs they report in order to lower the measured profits from which the parent's split is determined. The difficulty in monitoring cost and profit is the main strike against profit sharing.

15. a. The profit function is $\pi = -10 - 48Q + 15Q^2 - Q^3$. At outputs of 0, 2, 8, and 14, the respective profits are -10, -54, 54, and -486.

b. Marginal profit is $M\pi = d\pi/dQ = -48 + 30Q - 3Q^2 = -3(Q - 2)(Q - 8)$, after factoring. Thus, marginal profit is zero at Q = 2 and Q = 8. From part a, we see that profit achieves a local minimum at Q = 2 and a maximum at Q = 8.

Chapter 3

1. The fact that increased sales coincided with higher prices does not disprove the law of downward-sloping demand. Clearly, other factors – an increase in population and/or income, improved play of the home team, or increased promotion – could have caused increased ticket sales, despite higher prices.

2. a. $Q = 180 - (1.5)(80) = 60$ pairs. $R = (\$80)(60) = \$4{,}800$.

b. At P = \$100 and Q = 30 pairs, revenue falls to \$3,000 per month.

c. $E_P = (dQ/dP)(P/Q)$. At P = \$80, $E_P = (-1.5)(80/60) = -2$; At P = \$100, $E_P = (-1.5)(100/30) = -5$. Demand is much more elastic at the higher price.

3. a. $Q = 400 - (1{,}200)(1.5) + (.8)(1{,}000) + (55)(40) + (800)(1) = 2{,}400$.

b. $E_P = (dQ/dP)(P/Q) = (-1{,}200)(1.50)/2{,}400 = -.75$.
$E_A = (dQ/dA)(A/Q) = (.8)(1{,}000)/2{,}400 = .333$

c. Since demand is inelastic, McPablo's should raise prices, increasing revenues and reducing costs in the process.

4. a. The change in quantity sold is: $\%\Delta Q = (E_P)(\%\Delta P) = (-1.5)(5) = -7.5$ percent.

b. Because each firm's output is one-fourth of the total, the individual firm's elasticity is calculated with a one-fourth smaller Q in the denominator, making the elasticity 4 times as great or – 6.

c. Using the formula $\%\Delta Q = (E_P)(\%\Delta P)$ with $E_P = -1.5$ and $\%\Delta Q = 9$ percent, we solve to find: $\%\Delta P = -6$ percent. Price would be expected to fall by 6 percent.

5. The consultant should recommend an immediate price increase. As noted in the text, if demand is inelastic, the firm can always increase profit by raising price, thereby raising revenue and reducing cost.

6. a. This means that if the local population increases by 10 percent, ticket sales will increase by (.7)(10) = 7 percent. The actual population increase of 2.5 percent (from 60,000 to 61,500) implies a sales increase of 1.75 percent.

b. The 10 percent increase in ticket price implies a (.6)(10) = 6 percent fall in ticket sales. Because demand is inelastic, total ticket revenue increases.

c. Here, the increase in *total* revenue per admission (from $18 to $19) is only 5.55 percent. This is outweighed by the decline in admissions (6 percent) causing total revenue to fall.

7. a. With demand given by P = 30,000 - .1Q and MC = $20,000, we apply the MR = MC rule to maximize profit. Therefore, MR = 30,000 - .2Q = 20,000 implies Q* = 50,000 vehicles and P* = $25,000. GM's annual profit is (25,000 – 20,000)(50,000) – 180,000,000 = $70,000,000.

b. According to the markup rule (with MC = $20,800 and E_P = -9), the optimal price is: P* = [-9/(-9 + 1)][20,800] = $23,400. Because of very elastic demand, GM should discount its price in the foreign market (not raise it by $800).

c. This is a pure selling problem (the trucks have already been produced) so the goal is to maximize revenue. Setting MR = 0 implies 30,000 – 2Q = 0, or Q = 15,000 vehicles and P = $15,000. GM should discount the price (rather than hold it at $20,000) but not so low as to sell the whole 18,000 inventory. It should sell only 15,000 (and perhaps donate the other 3,000 to charity).

8. a. During this period, Mac computers, although technologically superior, were priced out of the range of many consumers. As a result of vigorous competition in the IBM PC clone market, prices of PCs were significantly lower. Soon these standardized PCs offered by numerous suppliers came to dominate the market. As a result of network externalities (making it beneficial to have the same computer platform as everyone else), the Mac rapidly lost market share.

b. Using the markup rule, we can see that with a price elasticity of -4 the profit-maximizing markup is 25% (expressed as a percentage of price). And note that this only reflects short-term profit maximization. An even smaller markup may be optimal when one considers long-run demand. Thus the 50% markup goal was unrealistic and far from profit maximizing.

c. It does make sense to concentrate in niche markets where demand may be less elastic and Apple already has significant market share. Likewise, software (and even hardware) that make Apple compatible with PCs will help break the network externalities enjoyed by PCs and encourage consumers to buy Macs. However, since network externalities continue to exist even with these innovations, it may not be prudent to abandon the low end of the market. Indeed, the introduction of the iMac indicates that Apple has not given up on the consumer market.

9. a. i. In pricing Triplecast, NBC faced a pure selling problem, the marginal cost of each additional subscriber being insignificant.

ii. Unfortunately, management dramatically misjudged its demand curve as well as the point of maximum revenue along it. Once it recognized the depressed state of demand, management instituted a dramatic price cut (trying to reach the demand point at which $E_P = -1$). This was its best course of action to capture what revenue was available. Over time, the partners reduced their package price from $125 to $99 to $79 and the daily price from $29.95 to $19.95 to $11.95. However, these actions at best were able only to stem large losses.

b. i. The main benefit of AOL's new pricing plan was attracting new customers. Indeed, the company raised its customer base over 18 months from 8 million to some 11 million subscribers. It also increased revenues from retailers, advertisers, and publishers, who would pay for access to AOL's customers. The main risk of the new plan was that some current customers would pay less each month for the same online use and others would greatly increase their use at the lower effective price.

ii. This is exactly what happened. Current customers more than doubled their daily time on-line. Constrained by a fixed capacity, AOL's system overloaded. Customers received busy signals and experienced interminable waits for access. (One commentator likened the new pricing policy to offering a perpetual all-you-can-eat buffet to food lovers, who once seated would eat through breakfast, lunch, and dinner, fearing they would not get back in if they gave up their table.) Customers were disaffected, and AOL was forced by regulators to give widespread refunds while it scrambled to increase its network capacity at a cost of $350 million.

10. The key point here is that the optimal prices in summer and winter depend upon the relative elasticities. Higher winter prices are warranted as long as winter demand is more inelastic. There is no contradiction between more inelastic winter demand and a lower occupancy rate. For instance, it is likely that the overall market is smaller in the winter (fewer people take extended vacations and this accounts for the lower occupancy rate) but the winter market is also less price sensitive (skiing is for the relatively wealthy).

11. Given the low price elasticity, the very high markup for Prilosec is not at all out of line. (The tremendous health and pain-relief benefits of the drug account for the low price elasticity.) We know that MC = $.60 per dose, P = $3.00 per dose and E_P is in the range –1.4 to –1.2. To test whether or not the current price is optimal, apply the markup rule: $P = [E_P/(1+ E_P)]MC$. For $E_P = -1.4$, the optimal price is $P^* = \$2.10$. In turn, for $E_P = -1.2$, $P^* = \$3.60$. Finally, for $E_P = -1.3$, $P^* = \$2.60$. Although the optimal price is quite sensitive to the precise estimate of elasticity, the high $3.00 price is consistent with elasticity within the estimated range.

12. If a firm can identify market segments with different elasticities, it can profit by charging different prices (even though marginal costs are the same.) It should set the price in each segment according to the optimal markup rule. The existence of substitute products should make demand for the firm's product more elastic. Accordingly, the firm should reduce its markup.

13. How should the manager set prices when taking different levels of costs into account? The answer is to apply the markup rule: $P = [E_P/(1 + E_P)]MC$. For instance, if changes in economic conditions cause the firm's marginal costs to rise, the correct action is to increase price (even though there may have been no change in price elasticity). For the same reason, an electric utility is justified in charging higher electric rates in the summer when supplying sufficient electricity to meet peak demand is very costly.

14. a. Frequent flier and frequent stay programs are primarily designed to induce strong allegiances and repeat business. It is also a subtle way of offering discounts (selectively) to enrollees (presumably, the most price sensitive customers).

b. Discount coupons deliver lower prices to the most price sensitive consumers, while the average consumer pays the regular, full price.

c. A guarantee to match a lower price is a way of winning sales from customers with the most elastic demand (who take the trouble to seek out a lower price), while maintaining higher prices for typical customers.

15. a. The garage owner should set prices to get the maximum revenue from the garage. The owner should offer higher hourly rates for short-term parking and all-day rates at a lower average cost per hour. This pre-vents short-term parkers from taking advantage of the all-day discount.

b. Start by setting MR = 0 for each segment. (This maximizes revenue in each separate segment.) The resulting optimal quantities are $Q_S = 300$ and $Q_C = 200$. Notice that the garage is not completely filled. The optimal prices are $P_S = \$1.50$ per hour and $P_C = \$1$ per hour.

c. Because there are only 400 places in the garage, the strategy in part (b) is not feasible. The best the operator can do is to fill up the garage and maximize revenue by ensuring that marginal revenue is the same for the segments. Equating $MR_S = MR_C$ and simplify-implies $Q_S = Q_C + 100$. Together with the fact that $Q_S + Q_C = 400$, one finds $Q_S = 250$ and $Q_C = 150$. The requisite prices are $P_S = \$1.75$ per hour and $P_C = \$1.25$ per hour.

16. a. Because demand conditions differ, the operator can profit from a policy of price discrimination. She faces a pure selling problem. In order to maximize weekday revenue (and profit), management sets $MR_d = 36 - .2Q_d = 0$ implying $Q_d = 180$ rounds and $P_d = \$18$ per round. On weekends, we have $MR_W = 50 - Q_W/6 = 0$ implies $Q_W = 300$ rounds. However, maximum capacity of the golf course is 240 rounds, so the operator must set $Q_W = 240$. The optimal weekend price is $P_W = \$30$.

b. To deter defections (and preserve revenue), the operator should narrow the price gap: raise weekday prices and lower weekend prices slightly.

Chapter 4

1. Survey methods are relatively inexpensive but are subject to potential problems: sample bias, response bias, and response accuracy. Test marketing avoids these problems by providing data on actual consumer purchases under partially controlled market conditions. Test marketing is much more costly than survey methods and suffers from two main problems. First, some important factors may be difficult to identify and control. Second, test market results are not a perfect guide to actual market experience down the road.

2. a. Coca Cola's management is likely to conclude that consumers will prefer New Coke to Coke Classic. However, as part (b) shows, they may be very wrong.

b. Yes, these rankings are consistent with the information in part (a). Consumers prefer Pepsi to Coke Classic by 58 to 42 (types A and C) and New Coke to Pepsi by 58 to 42 (B and C). However, a blind taste test between Classic and New Coke would have Classic preferred 84 to 16 (A and B)!

c. It would be a big mistake to replace Classic by New Coke. The obvious strategy is to retain Classic but also offer and promote New Coke. New Coke will attract type C