millions of dollars? Devise a product that saves Americans lots of time." LO2

4. Explain: LO2
   a. Before economic growth, there were too few goods; after growth, there is too little time.
   b. It is irrational for an individual to take the time to be completely rational in economic decision making.
   c. Telling your spouse where you would like to go out to eat for your birthday makes sense in terms of utility maximization.
5. In the last decade or so, there has been a dramatic expansion of small retail convenience stores (such as 7-Eleven, Kwik Shop, and Circle K), although their prices are generally much higher than prices in large supermarkets. What explains the success of the convenience stores? LO2
6. Many apartment-complex owners are installing water meters for each apartment and billing the occupants according to the amount of water they use. This is in contrast to the former procedure of having a central meter for the entire complex and dividing up the collective water expense as part of the rent. Where individual meters have been installed, water usage has declined 10 to 40 percent. Explain that drop, referring to price and marginal utility. LO3
7. Using the utility-maximization rule as your point of reference, explain the income and substitution effects of an increase in the price of product B, with no change in the price of product A. LO4
8. **ADVANCED ANALYSIS** A "mathematically fair bet" is one in which the amount won will on average equal the amount bet, for example, when a gambler bets, say, $100 for a 10 percent chance to win $1000 ($100 = .10 × $1000). Assuming diminishing marginal utility of dollars, explain why this is *not* a fair bet in terms of utility. Why is it even a less fair bet when the "house" takes a cut of each dollar bet? So is gambling irrational? LO4
9. Suppose that Ike is loss averse. In the morning, Ike's stockbroker calls to tell him that he has gained $1000 on his stock portfolio. In the evening, his accountant calls to tell him that he owes an extra $1000 in taxes. At the end of the day, does Ike feel emotionally neutral since the dollar value of the gain in his stock portfolio exactly offsets the amount of extra taxes he has to pay? Explain. LO5
10. You just accepted a campus job helping to raise money for your school's athletic program. You are told to draft a fundraising letter. The bottom of the letter asks recipients to write down a donation amount. If you want to raise as much money as possible, would it be better if the text of that section mentioned that your school is #3 in the nation in sports or that you are better than 99% of other schools at sports? Explain. LO5
11. **LAST WORD** What do you think of the ethics of using unconscious nudges to alter people's behavior? Before you answer, consider the following argument made by economists Richard Thaler and Cass Sunstein, who favor the use of nudges. They argue that in most situations, we couldn't avoid nudging even if we wanted to, because whatever policy we choose will contain some set of unconscious nudges and incentives that will influence people. Thus, they say, we might as well choose the wisest set of nudges.

Problems

1. Mylie's total utility from singing the same song over and over is 50 utils after one repetition, 90 utils after two repetitions, 70 utils after three repetitions, 20 utils after four repetitions, −50 utils after five repetitions, and −200 utils after six repetitions. Write down her marginal utility for each repetition. Once Mylie's total utility begins to decrease, does each additional singing of the song hurt more than the previous one or less than the previous one? LO1
2. John likes Coca-Cola. After consuming one Coke, John has a total utility of 10 utils. After two Cokes, he has a total utility of 25 utils. After three Cokes, he has a total utility of 30 utils. Does John show diminishing marginal utility for Coke, or does he show increasing marginal utility for Coke? Suppose that John has $3 in his pocket. If Cokes cost $1 each and John is willing to spend one of his dollars on purchasing a first can of Coke, would he spend his second dollar on a Coke, too? What about the third dollar? If John's marginal utility for Coke keeps on increasing no matter how many Cokes he drinks, would it be fair to say that he is addicted to Coke? LO1
3. Suppose that Omar's marginal utility for cups of coffee is constant at 1.5 utils per cup no matter how many cups he drinks. On the other hand, his marginal utility per doughnut is 10 for the first doughnut he eats, 9 for the second he eats, 8 for the third he eats, and so on (that is, declining by 1 util per additional doughnut). In addition, suppose that coffee costs $1 per cup, doughnuts cost $1 each, and Omar has a budget that he can spend only on doughnuts, coffee, or both. How big would that budget have to be before he would spend a dollar buying a first cup of coffee? LO2
4. Columns 1 through 4 in the table at the top of the next page show the marginal utility, measured in utils, that Ricardo would get by purchasing various amounts of products A, B, C, and D. Column 5 shows the marginal utility Ricardo gets from saving. Assume that the prices of A, B, C, and D are, respectively, $18, $6, $4, and $24 and that Ricardo has an income of $106. LO2

Column 1		Column 2		Column 3		Column 4		Column 5	
Units of A	MU	Units of B	MU	Units of C	MU	Units of D	MU	Number of Dollars Saved	MU
1	72	1	24	1	15	1	36	1	5
2	54	2	15	2	12	2	30	2	4
3	45	3	12	3	8	3	24	3	3
4	36	4	9	4	7	4	18	4	2
5	27	5	7	5	5	5	13	5	1
6	18	6	5	6	4	6	7	6	$\frac{1}{2}$
7	15	7	2	7	$3\frac{1}{2}$	7	4	7	$\frac{1}{4}$
8	12	8	1	8	3	8	2	8	$\frac{1}{8}$

a. What quantities of A, B, C, and D will Ricardo purchase in maximizing his utility?
b. How many dollars will Ricardo choose to save?
c. Check your answers by substituting them into the algebraic statement of the utility-maximizing rule.

5. You are choosing between two goods, X and Y, and your marginal utility from each is as shown in the table below. If your income is $9 and the prices of X and Y are $2 and $1, respectively, what quantities of each will you purchase to maximize utility? What total utility will you realize? Assume that, other things remaining unchanged, the price of X falls to $1. What quantities of X and Y will you now purchase? Using the two prices and quantities for X, derive a demand schedule (a table showing prices and quantities demanded) for X. LO3

Units of X	MU_x	Units of Y	MU_y
1	10	1	8
2	8	2	7
3	6	3	6
4	4	4	5
5	3	5	4
6	2	6	3

6. **ADVANCED ANALYSIS** Let $MU_A = z = 10 - x$ and $MU_B = z = 21 - 2y$, where z is marginal utility per dollar measured in utils, x is the amount spent on product A, and y is the amount spent on product B. Assume that the consumer has $10 to spend on A and B—that is, $x + y = 10$. How is the $10 best allocated between A and B? How much utility will the marginal dollar yield? LO3

7. Suppose that with a budget of $100, Deborah spends $60 on sushi and $40 on bagels when sushi costs $2 per piece and bagels cost $2 per bagel. But then, after the price of bagels falls to $1 per bagel, she spends $50 on sushi and $50 on bagels. How many pieces of sushi and how many bagels did Deborah consume before the price change? At the new prices, how much money would it have cost Deborah to buy those same quantities (the ones that she consumed before the price change)? Given that it used to take Deborah's entire $100 to buy those quantities, how big is the income effect caused by the reduction in the price of bagels? LO4

FURTHER TEST YOUR KNOWLEDGE AT
www.mcconnell19e.com

At the text's Online Learning Center (OLC), **www.mcconnell19e.com**, you will find one or more Web-based questions that require information from the Internet to answer. We urge you to check them out; they will familiarize you with Web sites that may be helpful in other courses and perhaps even in your career. The OLC also features multiple-choice questions that give instant feedback and provides other helpful ways to further test your knowledge of the chapter.

Indifference Curve Analysis

The utility-maximization rule previously discussed requires individuals to measure and compare utility, much as a business would measure and compare costs or revenues. Such *cardinal utility* is measured in units such as 1, 2, 3, and 4 and can be added, subtracted, multiplied, and divided, just like the cardinal numbers in mathematics. More importantly, cardinal utility allows precise quantification of the marginal utilities upon which the utility-maximizing rule depends. In fact, the marginal-utility theory of consumer demand that we explained in the body of this chapter rests squarely on the assumption that economists be able to measure cardinal utility. The reality, however, is that measuring cardinal utility is highly difficult, at best. (Can you, for instance, state exactly how many utils you are getting from reading this book right now or how many utils you would get from watching a sunset?)

To avoid this measurement problem, economists have developed an alternative explanation of consumer behavior and equilibrium in which cardinal measurement is not required. In this more-advanced analysis, the consumer must simply *rank* various combinations of goods in terms of preference. For instance, Sally can simply report that she *prefers* 4 units of A to 6 units of B without having to put number values on how much she likes either option. The model of consumer behavior that is based upon such *ordinal utility* rankings is called indifference curve analysis. It has two main elements: budget lines and indifference curves.

The Budget Line: What Is Attainable

We know from Chapter 1 that a **budget line** (or, more technically, a *budget constraint*) is a schedule or curve showing various combinations of two products a consumer can purchase with a specific money income. If the price of product A is $1.50 and the price of product B is $1, a consumer could purchase all the combinations of A and B shown in the table in Figure 1 with $12 of money income. At one extreme, the consumer might spend all of his or her income on 8 units of A and have nothing left to spend on B. Or, by giving up 2 units of A and thereby "freeing" $3, the consumer could have 6 units of A and 3 of B. And so on to the other extreme, at which the consumer could buy 12 units of B at $1 each, spending his or her entire money income on B with nothing left to spend on A.

Figure 1 also shows the budget line graphically. Note that the graph is not restricted to whole units of A and B as is the table. Every point on the graph represents a possible combination of A and B, including fractional quantities. The slope of the graphed budget line measures the ratio of the price of B to the price of A; more precisely, the absolute value of the slope is $P_B/P_A = \$1.00/\$1.50 = \frac{2}{3}$. This is the mathematical way of saying that the consumer must forgo 2 units of A (measured on the vertical axis) to buy

FIGURE 1 A consumer's budget line. The budget line shows all the combinations of any two products that someone can purchase, given the prices of the products and the person's money income.

Units of A (Price = $1.50)	Units of B (Price = $1)	Total Expenditure
8	0	$12 (= $12 + $0)
6	3	$12 (= $9 + $3)
4	6	$12 (= $6 + $6)
2	9	$12 (= $3 + $9)
0	12	$12 (= $0 + $12)