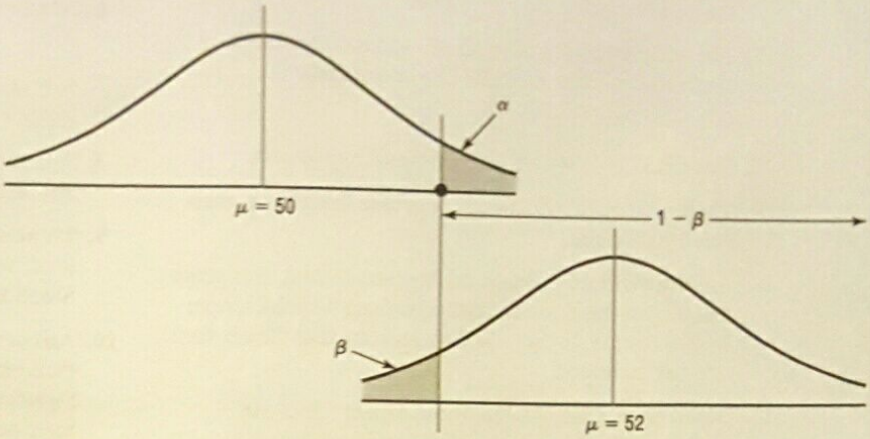
1. Find the power of a test, using the hypotheses given previously and $\alpha = 0.05$, $\sigma = 3$, and $n = 30$.
2. Select several other values for μ in H_1 and compute the power of the test. Generalize the results.

FIGURE 8–41
Relationship Among α, β, and the Power of a Test



Data Projects

Use a significance level of 0.05 for all tests below.

1. **Business and Finance** Use the Dow Jones Industrial stocks in data project 1 of Chapter 7 as your data set. Find the gain or loss for each stock over the last quarter. Test the claim that the mean is that the stocks broke even (no gain or loss indicates a mean of 0).
2. **Sports and Leisure** Use the most recent NFL season for your data. For each team, find the quarterback rating for the number one quarterback. Test the claim that the mean quarterback rating for a number one quarterback is more than 80.
3. **Technology** Use your last month's itemized cell phone bill for your data. Determine the percentage of your text messages that were outgoing. Test the claim that a majority of your text messages were outgoing. Determine the mean, median, and standard deviation for the length of a call. Test the claim that the mean length of a call is longer than the value you found for the median length.
4. **Health and Wellness** Use the data collected in data project 4 of Chapter 7 for this exercise. Test the claim that the mean body temperature is less than 98.6 degrees Fahrenheit.
5. **Politics and Economics** Use the most recent results of the Presidential primary elections for both parties. Determine what percentage of voters in your state voted for the eventual Democratic nominee for President and what percentage voted for the eventual Republican nominee. Test the claim that a majority of your state favored the candidate who won the nomination for each party.
6. **Your Class** Use the data collected in data project 6 of Chapter 7 for this exercise. Test the claim that the mean BMI for a student is more than 25.

Answers to Applying the Concepts

Section 8–1 Eggs and Your Health

1. The study was prompted by claims that linked eating eggs to high blood serum cholesterol.
2. The population under study is people in general.
3. A sample of 500 subjects was collected.
4. The hypothesis was that eating eggs did not increase blood serum cholesterol.
5. Blood serum cholesterol levels were collected.
6. Most likely, but we are not told which test.
7. The conclusion was that eating a moderate amount of eggs will not significantly increase blood serum cholesterol level.

Section 8–2 Car Thefts

1. The hypotheses are H_0: $\mu = 44$ and H_1: $\mu \neq 44$.
2. This sample can be considered large for our purposes.
3. The variable needs to be normally distributed.
4. We will use a z distribution.

10. When you are testing the difference between two means, the _____ test is used when the population variances are not known.
11. When the t test is used for testing the equality of two means, the populations must be _____.
12. The values of F cannot be _____.
13. The formula for the F test for variances is _____.

For each of these problems, perform the following steps.

a. State the hypotheses and identify the claim.
b. Find the critical value(s).
c. Compute the test value.
d. Make the decision.
e. Summarize the results.

Use the traditional method of hypothesis testing unless otherwise specified.

14. **Cholesterol Levels** A researcher wishes to see if there is a difference in the cholesterol levels of two groups of men. A random sample of 30 men between the ages of 25 and 40 is selected and tested. The average level is 223. A second random sample of 25 men between the ages of 41 and 56 is selected and tested. The average of this group is 229. The population standard deviation for both groups is 6. At $\alpha = 0.01$, is there a difference in the cholesterol levels between the two groups? Find the 99% confidence interval for the difference of the two means.

15. **Apartment Rental Fees** The data shown are the rental fees (in dollars) for two random samples of apartments in a large city. At $\alpha = 0.10$, can it be concluded that the average rental fee for apartments in the east is greater than the average rental fee in the west? Assume $\sigma_1 = 119$ and $\sigma_2 = 103$.

East					West				
495	390	540	445	420	525	400	310	375	750
410	550	499	500	550	390	795	554	450	370
389	350	450	530	350	385	395	425	500	550
375	690	325	350	799	380	400	450	365	425
475	295	350	485	625	375	360	425	400	475
275	450	440	425	675	400	475	430	410	450
625	390	485	550	650	425	450	620	500	400
685	385	450	550	425	295	350	300	360	400

Source: *Pittsburgh Post-Gazette.*

16. **Prices of Low-Calorie Foods** The average price of a random sample of 12 bottles of diet salad dressing taken from different stores is $1.43. The standard deviation is $0.09. The average price of a random sample of 16 low-calorie frozen desserts is $1.03. The standard deviation is $0.10. At $\alpha = 0.01$, is there a significant difference in price? Find the 99% confidence interval of the difference in the means.

17. **Jet Ski Accidents** The data shown represent the number of accidents people had when using jet skis and other types of wet bikes. At $\alpha = 0.05$, can it be concluded that the average number of accidents per year has increased from one period to the next?

Earlier period			Later period		
376	650	844	1650	2236	3002
1162	1513		4028	4010	

Source: *USA TODAY.*

18. **Salaries of Chemists** A random sample of 12 chemists from Washington state shows an average salary of $39,420 with a standard deviation of $1659, while a random sample of 26 chemists from New Mexico has an average salary of $30,215 with a standard deviation of $4116. Is there a significant difference between the two states in chemists' salaries at $\alpha = 0.02$? Find the 98% confidence interval of the difference in the means.

19. **Family Incomes** The average income of 15 randomly selected families who reside in a large metropolitan East Coast city is $62,456. The standard deviation is $9652. The average income of 11 randomly selected families who reside in a rural area of the Midwest is $60,213, with a standard deviation of $2009. At $\alpha = 0.05$, can it be concluded that the families who live in the cities have a higher income than those who live in the rural areas? Use the P-value method.

20. **Mathematical Skills** In an effort to improve the mathematical skills of 10 students, a teacher provides a weekly 1-hour tutoring session for the students. A pretest is given before the sessions, and a posttest is given after. The results are shown here. At $\alpha = 0.01$, can it be concluded that the sessions help to improve the students' mathematical skills?

Student	1	2	3	4	5	6	7	8	9	10
Pretest	82	76	91	62	81	67	71	69	80	85
Posttest	88	80	98	80	80	73	74	78	85	93

21. **Egg Production** To increase egg production, a farmer decided to increase the amount of time the lights in his hen house were on. Ten hens were randomly selected, and the number of eggs each produced was recorded. After one week of lengthened light time, the same hens were monitored again. The data are given here. At $\alpha = 0.05$, can it be concluded that the increased light time increased egg production?

Hen	1	2	3	4	5	6	7	8	9	10
Before	4	3	8	7	6	4	9	7	6	5
After	6	5	9	7	4	5	10	6	9	6

22. **Factory Worker Literacy Rates** In a random sample of 80 workers from a factory in city A, it was found that 5% were unable to read, while in a random sample of 50 workers in city B, 8% were unable to read. Can it be concluded that there is a difference in the proportions of nonreaders in the two cities? Use $\alpha = 0.10$. Find the 90% confidence interval for the difference of the two proportions.