```
    a = 5
End If
```

18.
```
If (j = 7) Then
  b = 1
Else
  If (j <> 7) Then
    b = 2
  End If
End If
```

19.
```
message = "Is Alaska bigger than Texas and California combined?"
answer = InputBox(message)
If (answer.Substring(0, 1) = "Y") Then
  answer = "YES"
End If
If (answer.Substring(0, 1) = "y") Then
  answer = "YES"
End If
If (answer = "YES") Then
  txtOutput.Text = "Correct"
Else
  txtOutput.Text = "Wrong"
End If
```

20.
```
message = "How tall (in feet) is the Statue of Liberty?"
feet = CDbl(InputBox(message))
If (feet <= 141) Then
  lstOutput.Items.Add("Nope")
End If
If (feet > 141) Then
   If (feet < 161) Then
     lstOutput.Items.Add("Close")
   Else
     lstOutput.Items.Add("Nope")
   End If
End If
lstOutput.Items.Add("The statue is 151 feet from base to torch.")
```

21. Write a program to determine how much to tip the server in a restaurant. The tip should be 15% of the check, with a minimum of $1.

22. A bagel shop charges 75 cents per bagel for orders of less than a half-dozen bagels and 60 cents per bagel for orders of a half-dozen or more. Write a program that requests the number of bagels ordered and displays the total cost. (Test the program for orders of four bagels and a dozen bagels.)

23. A store sells widgets at 25 cents each for small orders or at 20 cents each for orders of 100 or more. Write a program that requests the number of widgets ordered and displays the total cost. (Test the program for purchases of 5 and 200 widgets.)

24. A copy center charges 5 cents per copy for the first 100 copies and 3 cents per copy for each additional copy. Write a program that requests the number of copies as input and displays the total cost. (Test the program with the quantities 25 and 125.)

25. Write a quiz program to ask "Who was the first Ronald McDonald?" The program should display "Correct." if the answer is "Willard Scott" and "Nice try." for any other answer.

26. Suppose a program has a button with the caption "Quit". Suppose also that the Name property of this button is btnQuit. Write a btnQuit_Click event procedure that gives the user a second chance before ending the program. The procedure should use an input box to request that the user confirm that the program should be terminated, and then end the program only if the user responds in the affirmative.

27. Write a program that requests three scores as input and displays the average of the two highest scores.

28. Write a program to handle a savings-account withdrawal. The program should request the current balance and the amount of the withdrawal as input and then display the new balance. If the withdrawal is greater than the original balance, the program should display "Withdrawal denied." If the new balance is less than $150, the message "Balance below $150." also should be displayed.

29. A supermarket sells apples for $1.70 per pound. Write a cashier's program that requests the number of pounds and the amount of cash tendered as input and displays the change from the transaction. If the cash is not enough, the message "I need $x.xx more." should be displayed, where $x.xx is the difference between the total cost and the cash. (Test the program with six pounds and $20, and four pounds and $10.)

30. Write a program that requests a word (with lowercase letters) as input and translates the word into pig latin. The rules for translating a word into pig latin are as follows:

(a) If the word begins with a group of consonants, move them to the end of the word and add *ay*. For instance, *chip* becomes *ipchay*.

(b) If the word begins with a vowel, add *way* to the end of the word. For instance, *else* becomes *elseway*.

31. Federal law requires that hourly employees be paid "time-and-a-half" for work in excess of 40 hours in a week. For example, if a person's hourly wage is $8 and he works 60 hours in a week, his gross pay should be

$$(40 \times 8) + (1.5 \times 8 \times (60 - 40)) = \$560$$

Write a program that requests as input the number of hours a person works in a given week and his hourly wage, and then displays his gross pay.

32. The current calendar, called the Gregorian calendar, was introduced in 1582. Every year divisible by four was declared to be a leap year, with the exception of the years ending in 00 (that is, those divisible by 100) and not divisible by 400. For instance, the years 1600 and 2000 are leap years, but 1700, 1800, and 1900 are not. Write a program that requests a year as input and states whether it is a leap year. The program should not use any variables of type Date. (Test the program on the years 2008, 2009, 1900, and 2000.)

33. Create a form with a text box and two buttons captioned Bogart and Raines. When Bogart is first pressed, the sentence "I came to Casablanca for the waters." is displayed in the text box. The next time Bogart is pressed, the sentence "I was misinformed." is displayed. When Raines is pressed, the sentence "But we're in the middle of the desert." is displayed. Run the program and then press Bogart, Raines, and Bogart to obtain a dialogue.

34. Write a program that allows the user to use a button to toggle the color of the text in a text box between black and red.

35. Write a program that allows the user ten tries to answer the question, "Which U.S. President was born on July 4?" After three incorrect guesses, the program should display the hint, "He once said, 'If you don't say anything, you won't be called upon to repeat it.'" in a message box. After seven incorrect guesses, the program should give the hint, "His nickname was 'Silent Cal.'" The number of guesses should be displayed in a text box. (See Fig. 4.3.)
Note: Calvin Coolidge was born on July 4, 1872.

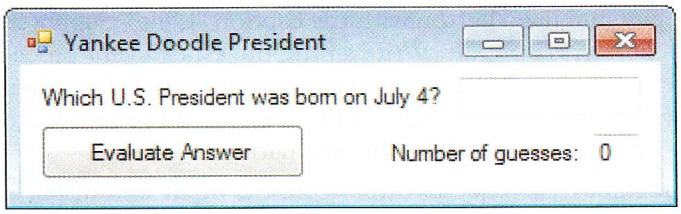
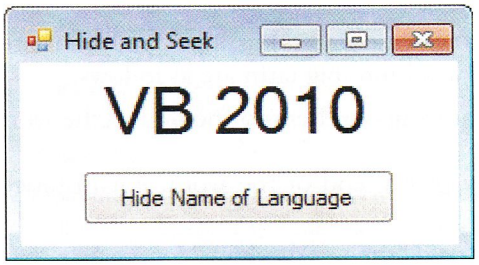


FIGURE 4.3 Form for Exercise 35.

36. Write a program that reads a test score from a text box each time a button is clicked and then displays the two highest scores whenever a second button is clicked. Use two class-level variables to track the two highest scores.

37. Write a program to play "Hide and Seek" with the name of our programming language. When the button is clicked on, the name should disappear and the caption on the button should change to "Show Name of Language." The next time the button is pressed, the name should reappear and the caption should revert to "Hide Name of Language," and so on.



OBJECT	PROPERTY	SETTING
frmHideSeek	Text	Hide and Seek
lblLanguage	Text	VB 2010
	Font.Size	26
btnDisplay	Text	Hide Name of Language

38. The flowchart in Fig. 4.5 (on the next page) calculates a person's state income tax. Write a program corresponding to the flowchart. (Test the program with taxable incomes of $15,000, $30,000, and $60,000.)

39. Rework Exercise 32 using a variable of type Date and the DateDiff function.

40. Write a program that requests your date of birth as input and tells you whether or not you are 25 years old or older. If not, the program should tell you the number of days until you will have your 25th birthday.

41. Write a program that requests your date of birth as input and tells your age. ***Hint:*** Use the DateDiff function with the DateInterval.Year option, and then use an If block to modify the result.

42. Savings accounts state an interest rate and a compounding period. If the amount deposited is P, the stated interest rate is r, and interest is compounded m times per year, then the balance in the account after one year is $P \cdot \left(1 + \frac{r}{m}\right)^m$. For instance, if $1000 is deposited at 3% interest compounded quarterly (that is, 4 times per year), then the balance after one year is

$$1000 \cdot \left(1 + \frac{.03}{4}\right)^4 = 1000 \cdot 1.0075^4 = \$1{,}030.34.$$

Interest rates with different compounding periods cannot be compared directly. The concept of APY (annual percentage yield) must be used to make the comparison. The APY for a stated interest rate r compounded m times per year is defined by

$$APY = \left(1 + \frac{r}{m}\right)^m - 1.$$

(The APY is the simple interest rate that yields the same amount of interest after one year as the compounded annual rate of interest.) Write a program to compare interest rates offered by two different banks and determine the most favorable interest rate. See Fig. 4.4.

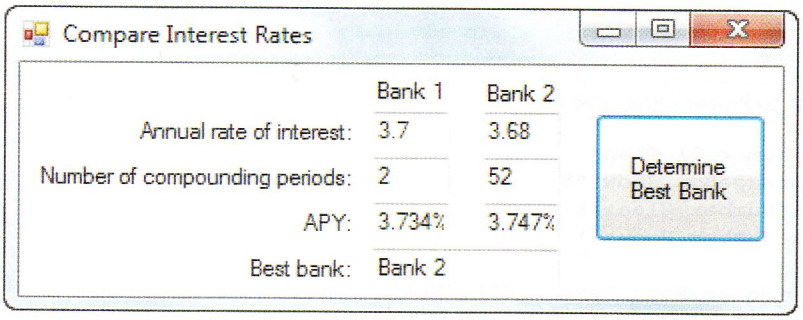


FIGURE 4.4 Possible outcome of Exercise 42.

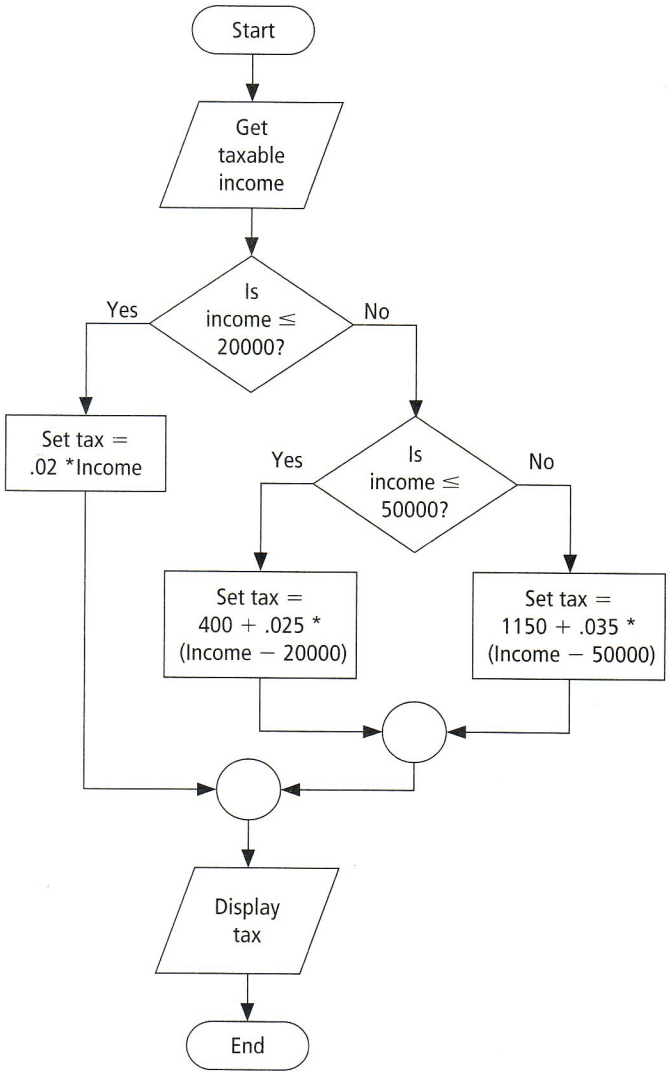


FIGURE 4.5 Flowchart for Exercise 38.

In Exercises 19 through 22, rewrite the code using a Select Case block.

19.
```
If a = 1 Then
    txtOutput.Text = "one"
Else
    If a > 5 Then
        txtOutput.Text = "two"
    End If
End If
```

20.
```
If a = 1 Then
    lstOutput.Items.Add("lambs")
End If
If ((a <= 3) And (a < 4)) Then
    lstOutput.Items.Add("eat")
End If
If ((a = 5) Or (a > 7)) Then
    lstOutput.Items.Add("ivy")
End If
```

21.
```
If a < 5 Then
    If a = 2 Then
        txtOutput.Text = "yes"
    Else
        txtOutput.Text = "no"
    End If
Else
    If a = 2 Then
        txtOutput.Text = "maybe"
    End If
End If
```

22.
```
If a = 3 Then
    a = 1
End If
If a = 2 Then
    a = 3
End If
If a = 1 Then
    a = 2
End If
```

23. Table 4.5 gives the terms used by the National Weather Service to describe the degree of cloudiness. Write a program that requests the percentage of cloud cover as input and then displays the appropriate descriptor.

TABLE 4.5 Cloudiness descriptors.

Percentage of Cloud Cover	Descriptor
0–30	clear
31–70	partly cloudy
71–99	cloudy
100	overcast

24. Table 4.6 shows the location of books in the library stacks according to their call numbers. Write a program that requests the call number of a book as input and displays the location of the book.

TABLE 4.6 Location of library books.

Call Numbers	Location
100 to 199	basement
200 to 500 and over 900	main floor
501 to 900 except 700 to 750	upper floor
700 to 750	archives

25. Figure 4.7 shows some geometric shapes and formulas for their areas. Write a program that requests the user to select one of the shapes, requests the appropriate lengths, and then gives the area of the figure.

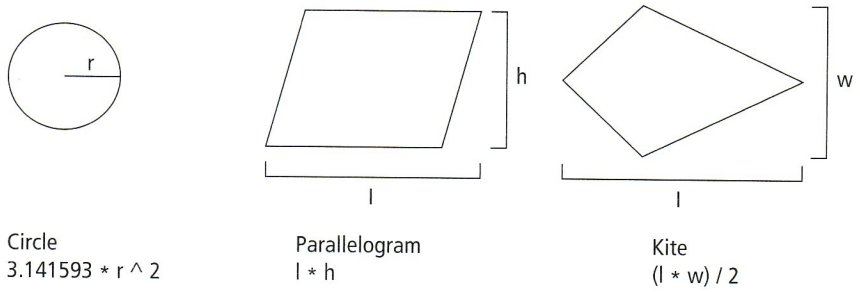


FIGURE 4.7 Areas of geometric shapes.

26. *Break-Even Analysis*. Suppose a certain product sells for a dollars per unit. Then the revenue from selling x units of the product is ax dollars. If the cost of producing each unit of the product is b dollars and the company has overhead costs of c dollars, then the total cost of producing x units of the product is $bx + c$ dollars. (***Note:* Revenue** is the amount of money received from the sale of the product. The values of a, b, and c are called the **marginal revenue**, **marginal cost**, and **fixed cost** respectively. The break-even point is the value of x for which the revenue equals the total cost.) Write a program that requests the marginal revenue, marginal cost, fixed cost, and number of units of the product produced and sold (x) and then displays one of the following three outputs: PROFIT, LOSS, or BREAK EVEN.

27. Write a program that requests an exam score and assigns a letter grade with the scale 90–100 (A), 80–89 (B), 70–79 (C), 60–69 (D), 0–59 (F). (Test the program with the grades 84, 100, and 57.)

VideoNote
Grading system (Homework)

28. Table 4.7 contains information on several states. Write a program that requests a state and category (flower, motto, and nickname) as input and displays the requested information. If the state or category requested is not in the table, the program should so inform the user.

TABLE 4.7 State flowers, nicknames, and mottoes.

State	Flower	Nickname	Motto
California	Golden Poppy	Golden State	Eureka
Indiana	Peony	Hoosier State	Crossroads of America
Mississippi	Magnolia	Magnolia State	By valor and arms
New York	Rose	Empire State	Ever upward

29. IRS informants are paid cash awards based on the value of the money recovered. If the information was specific enough to lead to a recovery, the informant receives 10 percent of the first $75,000, 5 percent of the next $25,000, and 1 percent of the remainder, up to a maximum award of $50,000. Write a program that requests the amount of the recovery as input and displays the award. (Test the program on the amounts $10,000, $125,000, and $10,000,000.) ***Note:*** The source of this formula is *The Book of Inside Information*, Boardroom Books, 1993.

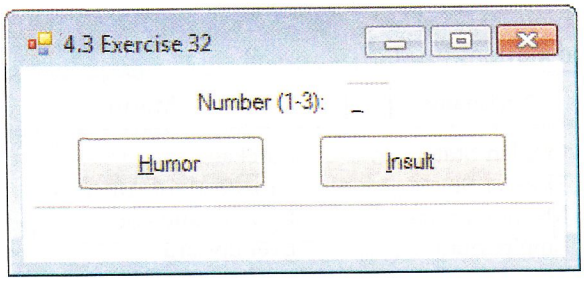
30. Table 4.8 contains the meanings of some abbreviations doctors often use for prescriptions. Write a program that requests an abbreviation and gives its meaning. The user should be informed if the meaning is not in the table.

TABLE 4.8 Physicians' abbreviations.

Abbreviation	Meaning
ac	before meals
ad lib	freely as needed
bid	twice daily
gtt	a drop
hs	at bedtime
qid	four times a day

31. Write a program that, given the last name of one of the six recent presidents beginning with Carter, displays his state and a colorful fact about him. (***Hint:*** The program might need to request further information.) (***Note***: Carter: Georgia; The only soft drink served in the Carter White House was Coca-Cola. Reagan: California; His Secret Service code name was Rawhide. George H. W. Bush: Texas; He celebrated his 85th birthday by parachuting out of an airplane. Clinton: Arkansas; In college he did a good imitation of Elvis Presley. George W. Bush: Texas; He once owned the Texas Rangers baseball team. Obama: Illinois; He was the eighth left-handed president.)

32. Write a programs in which the user enters a number into a masked text box and then clicks on the appropriate button to have either one of three pieces of humor or one of three insults displayed in a text box below the buttons. If the number entered is not between 1 and 3, the masked text box should be cleared. (***Note:*** Some possible bits of humor are "I can resist everything except temptation," "I just heard from Bill Bailey. He's not coming home," and "Adding people to a late software project makes it later." Some possible insults are "How much would you charge to haunt a house?" "I bet you have no more friends than an alarm clock," and "When your IQ rises to 30, sell.")



OBJECT	PROPERTY	SETTING
frmExercise32	Text	4.3 Exercise 32
lblNumber	Text	Number (1–3):
mtbNumber	Mask	0
btnHumor	Text	&Humor
btnInsult	Text	&Insult
txtSentence	ReadOnly	True