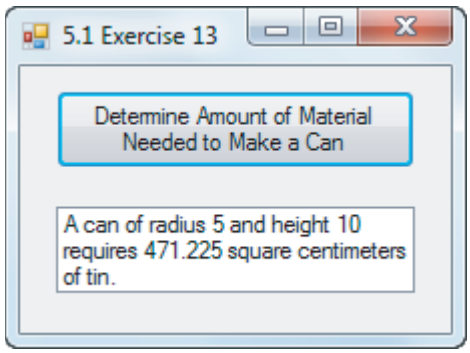
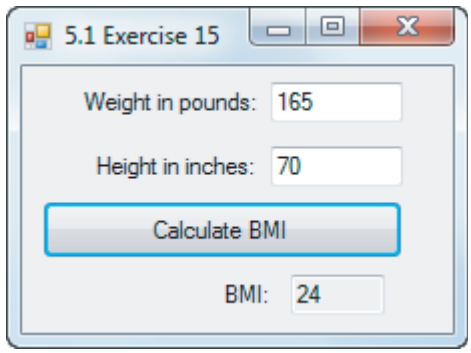
CHAPTER 5

EXERCISES 5.1

1. `203`
3. `The population will double in 24 years.`
5. `27 is an odd number.`
7. `Your state income tax is $150.00.`
9. `age before beauty`
11. `The function header should end with "As String", not "As Integer".`
13.
```
Private Sub btnDetermine_Click(...) Handles btnDetermine.Click
  Dim radius, height As Double
  lstOutput.Items.Clear()
  radius = CDbl(InputBox("Enter radius of can (in centimeters):"))
  height = CDbl(InputBox("Enter height of can (in centimeters):"))
  lstOutput.Items.Add("A can of radius " & radius & " and height " &
                      height)
  lstOutput.Items.Add("requires " & TinArea(radius, height) &
                      " square centimeters")
  lstOutput.Items.Add("of tin.")
End Sub

Function TinArea(ByVal radius As Double, ByVal ht As Double) As Double
  'Calculate surface area of a cylindrical can.
  Return 6.283 * (radius ^ 2 + radius * ht)
End Function
```

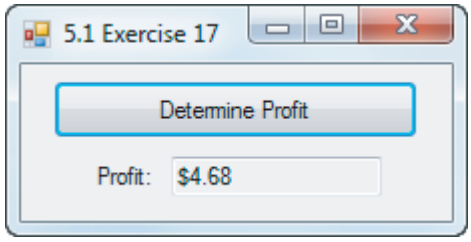


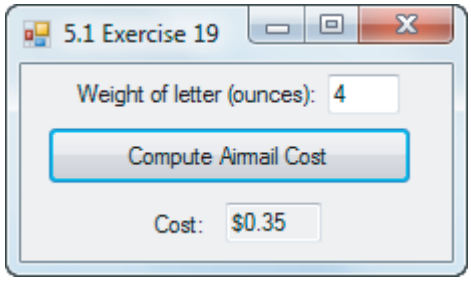


15.
```
Private Sub btnCalculate_Click(...) Handles btnCalculate.Click
  Dim weight As Double = CDbl(txtWeight.Text)
  Dim height As Double = CDbl(txtHeight.Text)
  txtBMI.Text = CStr(BMI(weight, height))
End Sub

Function BMI(ByVal w As Double, ByVal h As Double) As Double
  Return Math.Round((703 * w) / (h ^ 2))
End Function
```

17.
```
Private Sub btnDetermine_Click(...) Handles btnDetermine.Click
  Dim popcorn, butter, bucket, price As Double  'amount in dollars
  popcorn = CDbl(InputBox("What is the cost of the popcorn kernels?"))
  butter = CDbl(InputBox("What is the cost of the butter substitute?"))
  bucket = CDbl(InputBox("What is the cost of the bucket?"))
  price = CDbl(InputBox("What is the sale price?"))
  txtProfit.Text = FormatCurrency(Profit(popcorn, butter, bucket, price))
End Sub
```

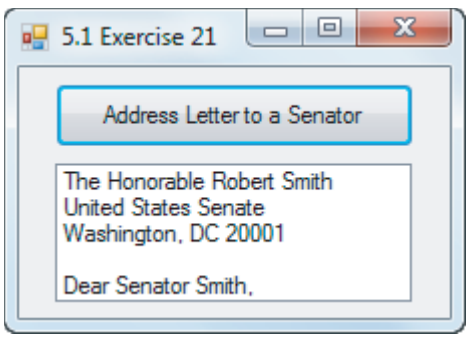
```
Function Profit(ByVal popcorn As Double, ByVal butter As Double,
                ByVal bucket As Double, ByVal price As Double) As Double
  'Calculate the profit on a bucket of popcorn
  Return price – (popcorn + butter + bucket)
End Function
```

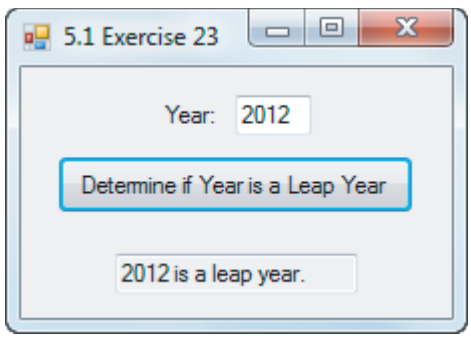




19.
```
Private Sub btnCompute_Click(...) Handles btnCompute.Click
  Dim weight As Double
  weight = CDbl(txtWeight.Text)
  txtOutput.Text = "The cost of mailing the letter was " &
                   FormatCurrency(Cost(weight)) & "."
End Sub

Function Ceil(ByVal x As Double) As Double
  Return –Int(–x)
End Function

Function Cost(ByVal weight As Double) As Double
  Return 0.05 + 0.1 * Ceil(weight – 1)
End Function
```

21.
```
Private Sub btnAddressNGreet_Click(...) Handles btnAddressNGreet.Click
  Dim name As String
  name = InputBox("Enter the senator's name:")
  lstOutput.Items.Add("The Honorable " & name)
  lstOutput.Items.Add("United States Senate")
  lstOutput.Items.Add("Washington, DC 20001")
  lstOutput.Items.Add("")
  lstOutput.Items.Add("Dear Senator " & LastName(name) & ",")
End Sub

Function LastName(ByVal name As String) As String
  Dim spacePos As Integer
  spacePos = name.IndexOf(" ")
  Return name.Substring(spacePos + 1)
End Function
```





23.
```
Private Sub btnDetermine_Click(...) Handles btnDetermine.Click
  If IsLeapYear(CInt(mtbYear.Text)) Then   'mask is 0000
    txtOutput.Text = mtbYear.Text & " is a leap year."
  Else
    txtOutput.Text = mtbYear.Text & " is not a leap year."
  End If
End Sub

Function IsLeapYear(ByVal yr As Integer) As Boolean
  Dim date1 As Date = CDate("#1/1/" & yr & "#")
  Dim date2 As Date = CDate("#1/1/" & (yr + 1) & "#")
  If DateDiff(DateInterval.Day, date1, date2) = 366 Then
    Return True
  Else
    Return False
  End If
End Function
```

EXERCISES 5.2

1.
```
88 keys on a piano
```

3.
```
You look dashing in blue.
```

5.
```
1440 minutes in a day
```

7.
```
Why do clocks run clockwise?

Because they were invented in the northern
hemisphere where sundials go clockwise.
```

9.
```
It was the best of times.
It was the worst of times.
```

11.
```
divorced
beheaded
died
divorced
beheaded
survived
```

13.
```
24 blackbirds
baked in
a pie.
```

15.
```
The first 6 letters are Visual.
```

17.
```
Cost: $250.00
Shipping cost: $15.00
Total cost: $265.00
```

19.
```
You passed with a grade of 92.
```

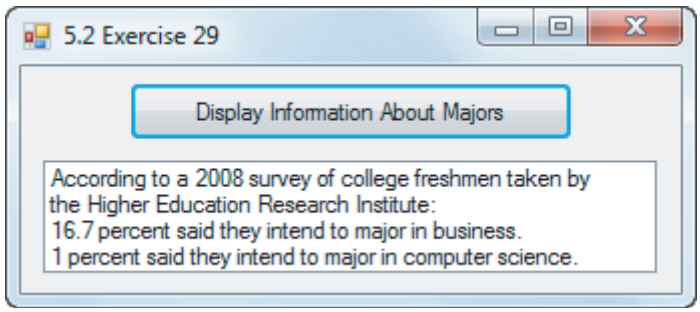
21. There is a parameter in the Sub procedure, but no argument in the statement calling the Sub procedure.

23. Since Handles is a keyword, it cannot be used as the name of a Sub procedure.

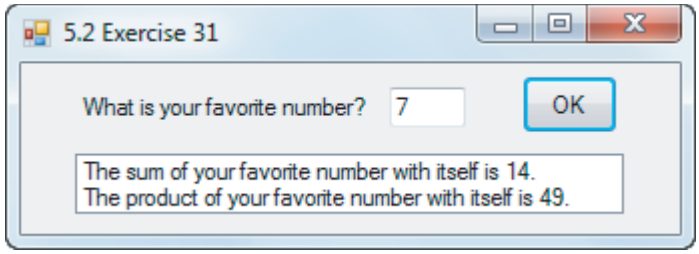
25.
```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
  Dim num As Integer = 7
  Lucky(num)
End Sub

Sub Lucky(ByVal num As Integer)
  txtOutput.Text = num & " is a lucky number."
End Sub
```

27.
```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
  Tallest("redwood", 362)
  Tallest("pine", 223)
End Sub

Sub Tallest(ByVal tree As String, ByVal ht As Double)
  lstBox.Items.Add("The tallest " & tree &
                   " tree in the U.S. is " & ht & " feet.")
End Sub
```

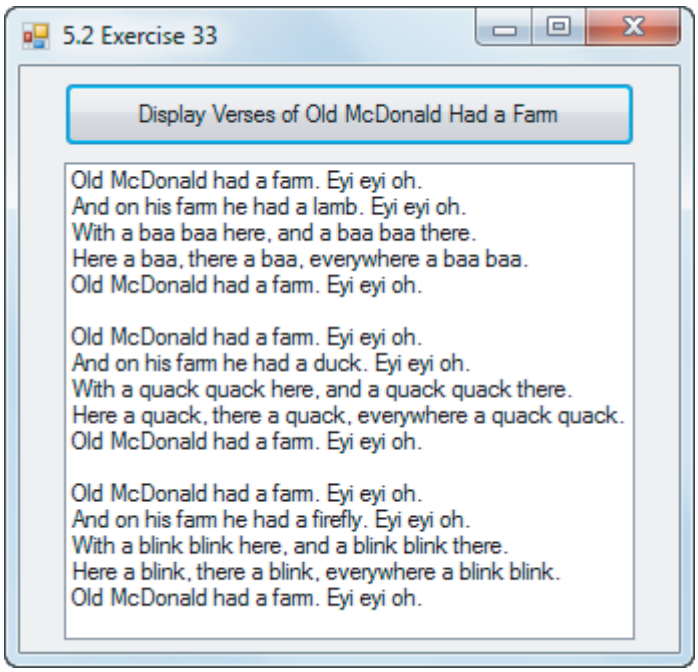
29.
```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
  DisplaySource()
  Majors(16.7, "business")
  Majors(1.0, "computer science")
End Sub

Sub DisplaySource()
  Dim phrase As String
  phrase = "According to a 2008 survey of college freshmen" &
           " taken by"
  lstOutput.Items.Add(phrase)
  lstOutput.Items.Add("the Higher Education Research Institute:")
End Sub

Sub Majors(ByVal percentOfStudents As Double, ByVal field As String)
  lstOutput.Items.Add(percentOfStudents &
              " percent said they intend to major in " & field & ".")
End Sub
```



31.
```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
  Dim num As Double
  num = CDbl(txtBox.Text)
  Sum(num)
  Product(num)
End Sub

Sub Sum(ByVal num As Double)
  Dim phrase As String
  phrase = "The sum of your favorite number with itself is "
  lstOutput.Items.Add(phrase & (num + num) & ".")
End Sub

Sub Product(ByVal num As Double)
  Dim phrase As String
  phrase = "The product of your favorite number with itself is "
  lstOutput.Items.Add(phrase & (num * num) & ".")
End Sub
```



33.
```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
  ShowVerse("lamb", "baa")
  ShowVerse("duck", "quack")
  ShowVerse("firefly", "blink")
End Sub

Sub ShowVerse(ByVal animal As String, ByVal sound As String)
  'Display a verse from Old McDonald Had a Farm
  lstOutput.Items.Add("Old McDonald had a farm. Eyi eyi oh.")
  lstOutput.Items.Add("And on his farm he had a " & animal &
                      ".  Eyi eyi oh.")
  lstOutput.Items.Add("With a " & sound & " " & sound & " here, and a " &
                       sound & " " & sound & " there.")
  lstOutput.Items.Add("Here a " & sound & ", there a " & sound &
                      ", everywhere a " & sound & " " & sound & ".")
  lstOutput.Items.Add("Old McDonald had a farm. Eyi eyi oh.")
  lstOutput.Items.Add("")
End Sub
```



35.
```
Private Sub btnDetermine_Click(...) Handles btnDetermine.Click
  Dim grade1 As Double = CDbl(txtGrade1.Text)
  Dim grade2 As Double = CDbl(txtGrade2.Text)
  Dim grade3 As Double = CDbl(txtGrade3.Text)
  DisplayHighestTwo(grade1, grade2, grade3)
End Sub

Sub DisplayHighestTwo(ByVal grade1 As Double, ByVal grade2 As Double,
                      ByVal grade3 As Double)
  Dim first, second As Double
  first = Max(grade1, grade2)
  If first = grade1 Then
    second = Max(grade2, grade3)
  Else
    second = Max(grade1, grade3)
  End If
```

```
    txtOutput.Text = "The highest two grades are " & first &
                     " and " & second & "."
End Sub

Function Max(ByVal num1 As Double, ByVal num2 As Double) As Double
  If num1 <= num2 Then
    Return num2
  Else
    Return num1
  End If
End Function
```

37.
```
Private Sub btnAlphabetize_Click(...) Handles btnAlphabetize.Click
  Dim word1 = txtWord1.Text
  Dim word2 = txtWord2.Text
  DisplayWords(word1, word2)
End Sub

Sub DisplayWords(ByVal word1 As String, ByVal word2 As String)
  Dim first, second As String
  If word1 <= word2 Then
    first = word1
    second = word2
  Else
    first = word2
    second = word1
  End If
  lstOutput.Items.Add(first)
  lstOutput.Items.Add(second)
End Sub
```

EXERCISES 5.3

1. `Gabriel was born in the year 1980.`

3. `The state flower of Alaska is the Forget Me Not.`

5. `The first 3 letters of EDUCATION are EDU.`

7. `Current inventory: 2` is displayed both times the button is clicked. The second click also produces the message "Insufficient inventory, purchase cancelled.")

9.
```
sum = 4
difference = 2
```

11.
```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
  Dim firstName As String = ""
  Dim lastName As String = ""
  Dim salary, newSalary As Double
  InputData(firstName, lastName, salary)
  newSalary = RaisedSalary(salary)
  DisplayOutput(firstName, lastName, newSalary)
End Sub

Sub InputData(ByRef firstName As String, ByRef lastName As String,
              ByRef salary As Double)
  firstName = txtFirstName.Text
  lastName = txtLastName.Text
  salary = CDbl(txtCurrentSalary.Text)
End Sub
```

```
Function RaisedSalary(ByVal salary As Double) As Double
  If salary <= 40000 Then
    Return 1.05 * salary
  Else
    Return salary + 2000 + 0.02 * (salary - 40000)
  End If
End Function

Sub DisplayOutput(ByVal firstName As String, ByVal lastName As String,
                  ByVal newSalary As Double)
  txtOutput.Text = "New salary for " & firstName & " " & lastName &
                   " is " & FormatCurrency(newSalary) & "."
End Sub
```

13.
```
Private Sub btnCalculate_Click(...) Handles btnCalculate.Click
  Dim annualRateOfInterest, monthlyPayment, begBalance As Double
  Dim intForMonth, redOfPrincipal, endBalance As Double
  InputData(annualRateOfInterest, monthlyPayment, begBalance)
  Calculate(annualRateOfInterest, monthlyPayment, begBalance,
            intForMonth, redOfPrincipal, endBalance)
  DisplayData(intForMonth, redOfPrincipal, endBalance)
End Sub

Sub InputData(ByRef annualRateOfInterest As Double,
              ByRef monthlyPayment As Double,
              ByRef begBalance As Double)
  annualRateOfInterest = CDbl(txtAnnualRateOfInterest.Text)
  monthlyPayment = CDbl(txtMonthlyPayment.Text)
  begBalance = CDbl(txtBegBalance.Text)
End Sub

Sub Calculate(ByVal annualRateOfInterest As Double,
              ByVal monthlyPayment As Double,
              ByVal begBalance As Double, ByRef intForMonth As Double,
              ByRef redOfPrincipal As Double, ByRef endBalance As Double)
  Dim monthlyRateOfInterest As Double = annualRateOfInterest / 12
  intForMonth = (monthlyRateOfInterest / 100) * begBalance
  redOfPrincipal = monthlyPayment - intForMonth
  endBalance = begBalance - redOfPrincipal
End Sub

Sub DisplayData(ByVal intForMonth, ByVal redOfPrincipal,
                ByVal endBalance)
  txtIntForMonth.Text = FormatCurrency(intForMonth)
  txtRedOfPrincipal.Text = FormatCurrency(redOfPrincipal)
  txtEndBalance.Text = FormatCurrency(endBalance)
End Sub
```

CHAPTER 6

EXERCISES 6.1

1. `18` **3.** `10` **5.** `Maximum number: 7`

7. Infinite loop. (To end the program, click on the *Stop Debugging* button on the Toolbar.)

9. Do and Loop are interchanged **11.** `While num >= 7` **13.** `Until response <> "Y"`