Section 4.2

Self Check

2. Draw evaluation trees for the following expressions:
   a. \( A = (B + A - B) \)
   b. \((C = (A + B)) \) or \(!\text{Flag} \)
   c. \((A \gg 7) \) and \((C >= 6) \) or \(!\text{Flag} \)
   d. \(! (B <= 12) \) and \((A \text{ mod } 2 = 0) \)
   e. \(! ((A > 5) \) or \((C < (A + B)) \))

Programming

1. Write a Boolean expression for each of the following relationships.
   a. Age is from 18 to 21 inclusive.
   b. Water is less than 1.5 and is greater than 0.1.
   c. Year is divisible by 4. \(\text{(Hint: Use mod.)}\)
   d. Speed is not greater than 55.

2. Write Boolean assignment statements for the following.
   a. Assign a value of True to Between if \( N \) is in the range \(-K \) to \(+K\), inclusive; otherwise, assign a value of False.
   b. Assign a value of True to Uppercase if \( \text{Ch} \) is an uppercase letter; otherwise, assign a value of False.
   c. Assign a value of True to Divisor if \( M \) is a divisor of \( N \); otherwise, assign a value of False.

Section 4.3

Programming

1. Write Pascal statements to carry out the following steps.
   a. If \( \text{Item} \) is nonzero, then multiply \( \text{Product} \) by \( \text{Item} \) and save the result in \( \text{Product} \); otherwise, skip the multiplication. In either case, print the value of \( \text{Product} \).
   b. Store the absolute difference of \( X \) and \( Y \) in \( Y \), where the absolute difference is \( (X - Y) \) or \( (Y - X) \), whichever is positive. Do not use the \text{Abs} function in your solution.
   c. If \( X \) is 0, add 1 to \( \text{ZeroCount} \). If \( X \) is negative, add \( X \) to \( \text{MinusSum} \). If \( X \) is greater than 0, add \( X \) to \( \text{PlusSum} \).
Section 4.5

Self Check

4. Find the syntax error and logic error in the if statement:
   
   ```
   if Num1 < 0 then
   begin
   Product := Num1 * Num2 * Num3;
   WriteLn ('Product is ', Product);
   end;
   else
   Sum := Num1 + Num2 + Num3;
   WriteLn ('Sum is ', Sum);
   ```

Programming

1. Write an if statement that, given two real values \( x \) and \( y \), will negate the two values if both are negative or both are positive.

Section 4.6

Programming

1. Modify the program for the payroll problem to deduct union dues of 10% for gross salary over $100.00 and 5% otherwise. Also, deduct a 3% city wage tax for all employees.

Section 4.8

Self Check

2. In Example 4.16, how many comparisons are required to execute the first if statement? What about the second? Which if statement is more efficient?
Programming

1. Rewrite the if statement for Example 4.13 using only the relational operator < in all conditions. Test for a failing grade first.
2. Implement the following decision table using a nested if statement. Assume that the grade point average is within the range 0.0 through 4.0.

<table>
<thead>
<tr>
<th>Grade Point Average</th>
<th>Transcript Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 – 0.99</td>
<td>Failed semester—registration suspended</td>
</tr>
<tr>
<td>1.0 – 1.99</td>
<td>On probation for next semester</td>
</tr>
<tr>
<td>2.0 – 2.99</td>
<td>(No message)</td>
</tr>
<tr>
<td>3.0 – 3.49</td>
<td>Dean's list for semester</td>
</tr>
<tr>
<td>3.5 – 4.0</td>
<td>Highest honors for semester</td>
</tr>
</tbody>
</table>

Chapter 4
Programming projects

1. Write procedures to draw a circle, square, and triangle. Then write a program that reads a letter C, S, or T and, depending on the letter chosen, draws either a circle, square, or triangle.

For this problem you should write a simple program and not use procedures. For drawing shapes you can use '*', for example you may draw a circle as:

```
***
*   *
*   *
*   *
***
```

- The following program contains (at least) seven errors. Please name five of them. You should mention the line number and give a short explanation of the error. Try to find the errors by only looking at the
program text and run Turbo Pascal only if really necessary. There may be a similar exercise in the midterm exam, and there you cannot use a computer.

(1) PROGRAM fullOfErrors(input, output);
(2) USES WinCrt;
(3) VAR
(4)   b: boolean,
(5)   i: int;
(6) BEGIN
(7)   readln(1);
(8)   b := (i < 1);
(9)   IF b THEN
(10)      write(5);
(11) ELSE BEGIN
(12)      j := write(6);
(13) END