Recursion

Review Questions

18.4.2 - For the **isPalindrome** method in Listing 18.3 (given below), what are the base cases? How many times is this method called when invoking **isPalindrome ("abdxcxdba")**?

LISTING 18.3 RecursivePalindromeUsingSubstring.java

```
1 public class RecursivePalindromeUsingSubstring {
2 public static boolean isPalindrome(String s) {
3 if (s.length() <= 1) // Base case
4 return true;
5 else if (s.charAt(0) != s.charAt(s.length() - 1)) // Base case
6 return false;
7 else
8 return isPalindrome(s.substring(1, s.length() - 1));
9 }
10
11 public static void main(String[] args) {
12 System.out.println("Is moon a palindrome? "
13 + isPalindrome("moon"));
14 System.out.println("Is noon a palindrome? "
15 + isPalindrome("noon"));
16 System.out.println("Is a a palindrome? " + isPalindrome("a"));
17 System.out.println("Is aba a palindrome? " +
18 isPalindrome("aba"));
19 System.out.println("Is ab a palindrome? " + isPalindrome("ab"));
20 }
21 }
```

```
Is moon a palindrome? false
Is noon a palindrome? true
Is a a palindrome? true
Is aba a palindrome? true
Is ab a palindrome? false
```

18.6.3 - How many times will the **getSize** method (given below) be invoked for a directory if the directory has three subdirectories and each subdirectory has four files?

LISTING 18.7 DirectorySize.java

```
1 import java.io.File;
2 import java.util.Scanner;
3
4 public class DirectorySize {
5 public static void main(String[] args) {
6 // Prompt the user to enter a directory or a file
7 System.out.print("Enter a directory or a file: ");
8 Scanner input = new Scanner(System.in);
9 String directory = input.nextLine();
```

```
10
11 // Display the size
12 System.out.println(getSize(new File(directory)) + " bytes");
13 }
14
15 public static long getSize(File file) {
16 long size = 0; // Store the total size of all files
17
18 if (file.isDirectory()) {
19 File[] files = file.listFiles(); // All files and subdirectories
20 for (int i = 0; files != null && i < files.length; i++) {
21 size += getSize(files[i]); // Recursive call
22 }
23 }
24 else { // Base case
25 size += file.length();
26 }
27
28 return size;
29 }
30 }
```

```
Enter a directory or a file: c:\book Enter
48619631 bytes
```

```
Enter a directory or a file: c:\book\Welcome.java Enter
172 bytes
```

```
Enter a directory or a file: c:\book\NonExistentFile Enter
0 bytes
```

18.6.6 Will the program work if lines 20–21 is replaced by the following code?

```
for (File file: files)
  size += getSize(file);   // Recursive call
```

Programming Exercises

***18.7** - (*Fibonacci series*) Modify Listing 18.2, ComputeFibonacci.java, so that the program finds the number of times the **fib** method is called. (*Hint*: Use a static variable and increment it every time the method is called.)