CSC171 — Homework 16

Recursion

The goal of this assignment is to give you experience with recursion and writing recursive methods (functions). Be sure that you are comfortable tracing the execution of these functions: what values are passed, what happens to them, how the parameters and local variables work, what is returned (if any), and how the return value gets used. These are not new concepts, but recursive methods test that you really understand it all.

Questions

1. Write a recursive function that multiplies two numbers x and y. Your main method should prompt the user for the two numbers, call your function, and print the result.

2. A "numerical palindrome" is a number whose decimal digits are the same when read left-to-right or right-to-left. Write a recursive method that checks whether a given number is a numerical palindrome. DO NOT convert the number to a string. Your main method should prompt the user for a number, test it, and print the result. Hint: Getting the last digit of a number is easy. How would you get the first digit? Do it using some math and some code, not by having Java convert the number to a string.

3. *Lucas Numbers* are defined recursively as follows:

$$\begin{aligned} L_0 &= 2 \\ L_1 &= 1 \\ L_n &= L_{n-1} + L_{n-2} \end{aligned}$$

   Write a recursive method that computes the n^{th} Lucas number and have your main method illustrate its use.

4. A *Fibonacci Word* is a string of 0's and 1's defined recursively as follows:

$$\begin{aligned} S_0 &= \text{“0”} \\ S_1 &= \text{“01”} \\ S_n &= S_{n-1} \text{ concatenated with } S_{n-2} \end{aligned}$$

   Write a recursive method that computes the n^{th} Fibonacci word and have your main method illustrate its use.

Grading Scheme

Equal weight for each part.

Doesn't compile or is trivial	$< 50\%$
Compiles and is non-trivial	$\geq 50\%$
Complete and correct with good style and comments	100%
Incomplete, incorrect, bad style, no comments	$< 100\%$

Submission Requirements

Your submission **MUST** include a file named "`README.txt`" with your name, your NetID, the assignment number, and your lab section. This file should explain anything we need to know about how to build and run your project. In particular, be sure to explain how to run what parts of your submission for each question in the assignment.

Submit your solution as a single ZIP archive to BlackBoard before the deadline.

Late homeworks will not be graded and will receive a grade of 0.

All assignments and activities associated with this course must be performed in accordance with the University of Rochester's Academic Honesty Policy.