Lab: Recursion

CS 162

Introduction

You've seen a few examples of recursion in lecture, but you have not yet had an opportunity to solve recursion problems on your own. This lab will give you more practice solving problems recursively. Before you try to program a solution to any of the problems, brainstorm the solution out on paper. Be sure to identify the base case and the recursive step.

Exercise 1: Fibonacci

Write Java code for a recursive method for computing the Fibonacci sequence. Recall that the Fibonacci sequence is defined as:

- Fib(1) = 1
- Fib(2) = 1
- Fib(n) = Fib(n-1) + Fib(n-2) (if n > 2)

Exercise 2: Palindromes

Write Java code for a recursive method that determines if a given string is a palindrome. The method should take a string as a parameter and return a boolean.
Examples: civic, deed, kayak, deleveled, aibohphobia (the fear of palindromes)

Exercise 3: Find the Bad Coin

For this problem, you will not be writing code. Your goal is to identify the recursive solution. You may work in a group of two for this problem if you wish.

Problem: You have a pile of coins. They are all the same except one is heavier than the rest. All you have is a balancing scale. Design a recursive algorithm for finding the one coin that is heavier. For simplicity, you can assume there is always 2^n number of coins.

Harder Problem: What if you don't know if the coin is heavier or lighter? How would you solve the bad coin in this case?

Follow-Up

I highly recommend finishing these exercises after the lab if you do not have enough time within the lab to complete them. If you need help outside of the lab, you can visit the mentor

office or come during my office hours.