ECS 32B – Introduction to Data Structures
Homework 04

Due: October 30, 2020, 5:00pm PST

Important:

- The purpose of the homework is to practice recursion. **All four functions must be recursive.** If you didn't use recursion, only half of the points will be given.
- You may upload as many times as you want before the deadline. Each time the autograder will let you know how many of the test cases you have passed/failed. To prevent people from manipulating the autogader, the content of only half of the test cases are visible.
- Please **do not copy others' answers**. Autograder can detect similar code.

Problem 1: smallest

Write a recursive function called `smallest` that given a non-empty Python list, returns the smallest element in the list.

Examples:

- Input: [5, 9, 2, 4]
  Output: 2
- Input: [5, 9, 4, 4]
  Output: 4

Problem 2: sumOfSequence

Write a recursive function called `sumOfSequence` that omputes the sum of the first n items in the sequence of numbers

$$1, 4, 9, 16, 25, 36, 49, ..., n^2.$$

Examples:

- Input: 3
  Output: 14
  Explanation: $14 = 1 + 2^2 + 3^2$
- Input: 5
  Output: 55
  Explanation: $14 = 1 + 2^2 + 3^2 + 4^2 + 5^2$

Problem 3: isPalindrome

Write a function called `isPalindrome` that checks if a (possibly empty) string is a palindrome. Given a string, return true if it is a palindrome and return false otherwise.

Examples:

- Input: "abccba"
  Output: `True`
- Input: "abcabc
  Output: `False`

Problem 4: ladder

Assume you are climbing a ladder. The ladder has n rungs. You can only climb one or two rungs at a time. How many different ways can you climb to the top?

For example, if there are three rungs on the ladder, there are three different ways to climb to the top:

1. 1 rung + 1 rung + 1 rung
2. 1 rung + 2 rungs
3. 2 rungs + 1 rung

Use recursion to write a function called `ladder` that calculates the number of different ways you can get to the top. Assuming with a ladder with no rungs, you are already at the top and return 1.

Examples:

- Input: 5
  Output: 8
- Input: 10
  Output: 89