National University of Singapore
School of Computing
TT1003: Programming Methodology Clinic
Semester II, 2024/2025

Optional Practices : Iteration and Recursion

Background

This is an **optional** PE1-style practice question created by Zhu Ming.

Problem 1: Sorting Two Numeric Strings (Ideal time: 5 minutes)

Write a function, `sort_two_numeric_strings` that takes two strings of numerical digits, each already arranged in ascending order, as input. The function should return a string containing all digits from both input strings, merged while maintaining sorted order.

For an iterative approach, the entire solution must be implemented purely iteratively. For a recursive approach, the entire solution must be implemented purely recursively.

```
>>> sort_two_numeric_strings('123', '456')
'123456'
>>> sort_two_numeric_strings('111', '456')
'111456'
>>> sort_two_numeric_strings('123', '')
'123'
```

Problem 2: Sorting Two Number (Ideal time: 10 minutes)

Write a function, `sort_two_num` that takes two **positive** integers, each with digits arranged in ascending order, as input. The function should return an integer containing all the digits from both input integers, merged while maintaining sorted order.

For an iterative approach, the entire solution must be implemented purely iteratively. For a recursive approach, the entire solution must be implemented purely recursively. Input is guaranteed to be positive integers, $n > 0$.

```
>>> sort_two_num(123, 456)
123456
>>> sort_two_num(111, 456)
111456
```

Problem 3: Palindrome (Ideal time: 5 minutes)

Write a function, `min_char_required` that takes in a string and determine the minimum number of characters that must be added to the string to make it a palindrome. A palindrome is a string that reads the same forwards and backwards.

For a recursive approach, the entire solution must be implemented purely recursively. (Iteration is too hard for this question)

```
>>> min_char_required('racecar')
0
>>> min_char_required('aaab')
1
>>> min_char_required('abc')
2
>>> min_char_required('abbbbbbbbbbbbbbbbbbbbdcda')
3
>>> min_char_required('adcdbbbbbbbbbbbbbbbbbbbba')
3
```