

LAB ASSIGNMENT III

Course Instructor: Dr. Dibyendu Roy

Due: Nov 27, 2023, 11:59 pm

Instructions: Code must be written in C language and it must be well commented. Write name and roll number on the top of your code. Submission of code in any other file extension (.pdf, .docx etc) will not be accepted. The file name of your code will be **YOUR ROLL-NO.c**

Let $\{a, b\}^*$ denote the set of all possible finite length strings consisting of the symbols a and b , including the empty string. For two strings x, y , let xy denote their concatenation.

- (a) Consider the set (also called a language) $L = \{ww : w \in \{a, b\}^*\}$. Write a function that on input a string x tests and outputs whether or not $x \in L$.
- (b) For any set of strings S , let $S_i = \{x_1x_2 \cdots x_i : x_1, x_2, \dots, x_i \in S\}$, the set of all strings obtained by concatenating i arbitrary strings from S . Define S^* as

$$S^* = \cup_{i=0}^{\infty} S_i,$$

that is, S^* is a set consisting of the empty string and all strings of finite length obtained by concatenating arbitrary elements of S .

Write a function that takes as input a string y and determines whether or not $y \in L^*$ as efficiently as possible. Here, L is the language defined in Part (a). You will need the function from the previous part here. Try to minimize the number of calls to the function from Part (a).

In the `main()` function,

- Read a string y .
- Call the function from the second part and output 'Yes' indicating that $y \in L^*$ or 'No' indicating that $y \notin L^*$.

You are not allowed to use any library functions for string manipulation other than `strlen` only.

Sample Input/Output:

1. Enter string: bbbbababbaabbaababaaabaa
Yes
2. Enter string: bbaabbbaaaba
No
3. Enter string: aaabbb
No
4. Enter string: aabb
Yes