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ATIONAL NIVERSITY 

OF COMPUTER & EMERGING SCIENCES

PESHAWAR CAMPUS

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**Problem Set :** Implement 01 **Semester:** FALL 2021

**Date Set :** Monday December 20, 2021 **Due Date :** Friday Dec.24, 2021 **Course :** CS301 Theory of Automata **Instructor:** Shakir

Language **{a^(**n+1**) b^(**n+1**) a^(**n+1**) | n> 0 = }**

**Descriptive Definition:**

‘n+1’ number of A’s and ‘n+1’ number of B’s are followed by same ‘n+1’ number of A’s. Where n>0.

**Words:**

{aabbaa, aaabbbaaa, aaaabbbbaaaa , aaaaabbbbbaaaaa,

aaaaaabbbbbbaaaaaa,aaaaaaabbbbbbbaaaaaaa, aaaaaaaabbbbbbbbaaaaaaaa, aaaaaaaabbbbbbbbbaaaaaaaaa,

aaaaaaaaaabbbbbbbbbbaaaaaaaaaa}

CODE:  
import sys

s = input("Enter test string: ")  # read the sample test string

count\_leading\_a = 0  # count the leading a's in the string

i = 0

while i < len(s) and s[i] == 'a':

    # loop for all the leading a's and increase count

    count\_leading\_a += 1

    i += 1

 # since n > 0, n+1 > 1, the count\_leading\_a must be >= 2, otherwise the turing machine rejects such strings

if count\_leading\_a < 2:

    print(s, "this string is not accepted by Turing machine")

    # rejects the string and exits

    sys.exit()

 # code reaches here if count\_leading\_a >= 2, next step is to count the b's

count\_b = 0

while i < len(s) and s[i] == 'b':

    count\_b += 1

    i += 1

 # count of b's must be equal to count of leading a's, otherwise the turing machine rejects such strings

if count\_b != count\_leading\_a:

    # rejects the string and exits

    print(s, "this string is not accepted by Turing machine")

    sys.exit()

# code reaches here if count\_leading\_a equals count\_b, next step is to count the the a's at the end of string

count\_a = 0

while i < len(s) and s[i] == 'a':

    count\_a += 1

    i += 1

 # count of a's at end must be equal to count of leading a's, otherwise the turing machine rejects such strings

if count\_a != count\_leading\_a:

    # rejects the string and exits

    print(s, "this string is not accepted by Turing machine")

    sys.exit()

 # code reaches here if string is in language a^n+1 b^n+1 a^n+1, Turing machine accepts such string

print(s, "this string is accepted by the turing machine (it belongs to given language)")

TURING MACHINE:

