



Bahria University
Lahore Campus
Department of Computer Sciences

THEORY OF AUTOMATA
ASSIGNMENT # 01

DUE DATE: 14, OCTOBER 2023

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Program: BSCS 4A

Q.1 Consider the following recursive definition of PALINDROME:

- a. Rule 1. a and b are in PALINDROME
Rule 2. If x is in PALINDROME then so are axa and bxb .
Unfortunately the words defined by the rules have odd lengths. Fix the problem such that all appropriate words are included.
- b. Prove that if x is in PALINDROME then so is x^n for any n .
- c. Prove that if z^n is in PALINDROME (for positive integer n) then so is z .
- d. Prove that PALINDROME has as many word of length $2n$ as it does of length $2n-1$.
How many words is that?

Q.2 Construct a regular expression defining each of the following languages over $\{a, b\}$:

- a. All strings such that the number of a 's is a multiple of 3.
- b. All strings such that the number of a 's is odd.

Q.3 Construct a regular expression over $\{a, b\}$ of all words that do not have both the substrings bba and abb .

Q.4 Construct a regular expression over $\{a, b\}$ containing all string that have an even number of a 's an odd number of b 's

Q.5 Show that the following pair of regular expressions define the same language over alphabet $\{a, b\}$: $a(ba+a)^*b$ and $aa^*b(aa^*b)^*$

Q.6 Show that the following pair of regular expressions define the same language over alphabet $\{a, b\}$: $a(aa)^*(\wedge+a)b+b$ and a^*b

Good Luck☺