Assignment 1

Overview

The goal of this assignment is to practice concepts of regular languages. This assignment provides practice for students to understand the teaching materials more deeply.

Rules and Deliverables

- This is an individual assignment.
- Cheating of any kind is NOT tolerated! Assignments will be checked against each other, and illegal collaboration will be treated based on the University dishonesty policy.
- The due date will be **Saturday 9/14/2024 at 11:59pm**.
- Submitting the assignment 24 hours after the due date will result in a deduction of 20% from the student's grade.
- Each student should submit:
    1. The answers document in a PDF format.
    2. The complete name and EUID of students must be written within the document.
- The assignment must be submitted only through Canvas.

Assignment Description

1. If doable, find a regular expression for the following languages over alphabet {a, b}.
    i. Strings with an odd number of **a**
    ii. Both the number of a's and the number of b's are <u>even</u>
    iii. No string contains the substring **aa**
    iv. $\{a^{2n} \mid n \in N\} \cup \{b^{2n+1} \mid n \in N\}$ while N= {0,1,2, 3,...}

2. Construct a DFA for the following regular expressions:

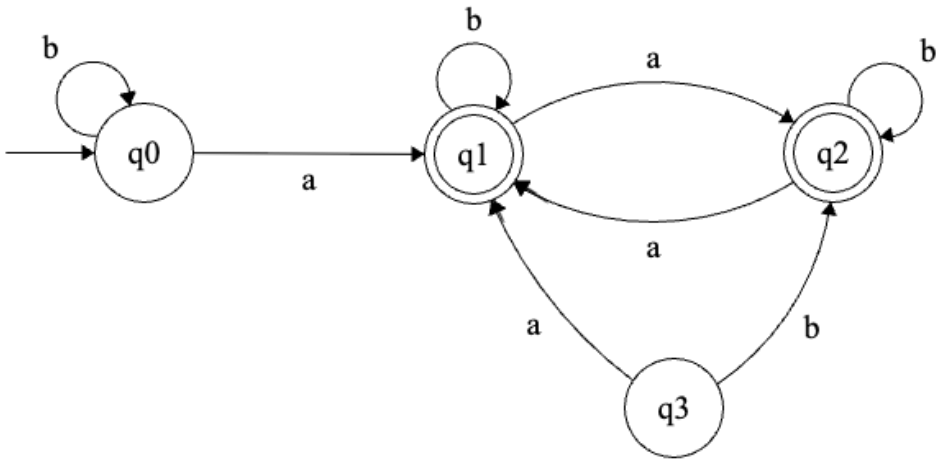
   i. 1*01(0+11)*

   ii. ab* + c

   iii. ab*+bc*

   iv. b* + b*a(ba)*

3. Consider the following Finite State Machine,



   a. Give an equivalent Regular Expression for the above FSM.

   b. Design an equivalent automaton (DFA) to the above FSM with minimum number of states.