CSCE 5400 Formal Languages, Automata, and Computability - Fall 2024

Name: Kishan Kumar Zalavadia

EUID: 11685261

1. If doable, find a regular expression for the following languages over alphabet {a, b}.

   i. Strings with an odd number of **a**

   Ans: b*a(b*ab*a)*b*

   Or

   b*ab*(b*ab*ab*)*

   ii. Both the number of a's and the number of b's are even

   Ans: (aa + bb + (ab+ba)(aa+bb)*(ab+ba))*

   iii. No string contains the substring **aa**

   Ans: (b+ab)*(a+ ϵ)

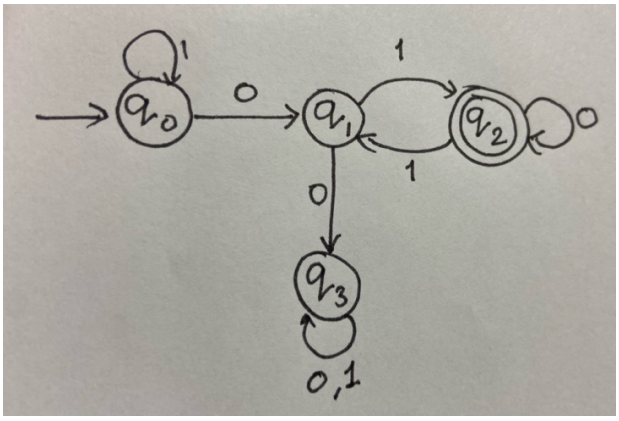
   iv. {a**2n** | n ϵ N} U {b**2n+1** | n ϵ N} while N= {0,1,2, 3,...}

   Ans: (aa)* + b(bb)*

2. Construct a DFA for the following regular expressions :

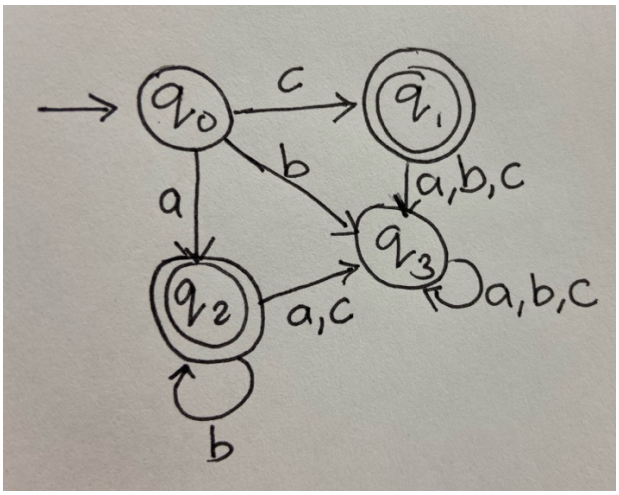
i. 1*01(0+11)*

Ans:



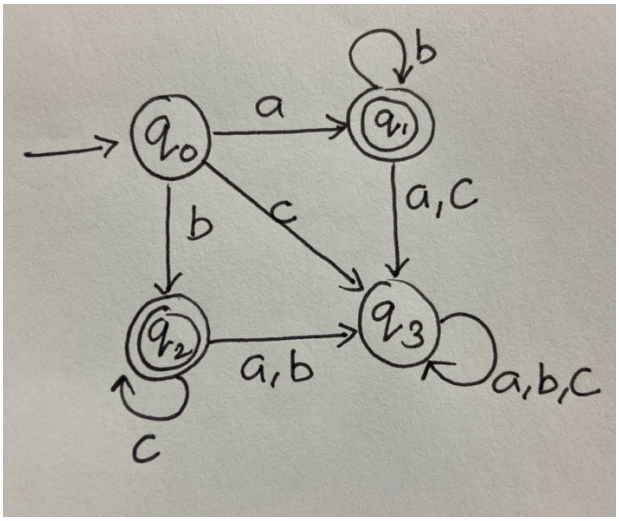
ii. ab* + c

Ans:



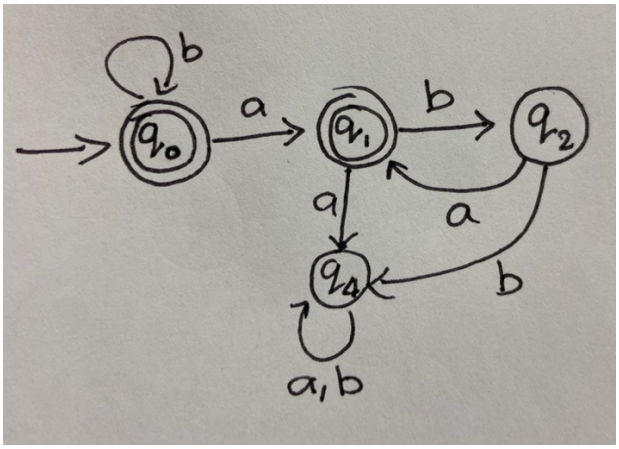
iii. ab*+bc*

Ans:

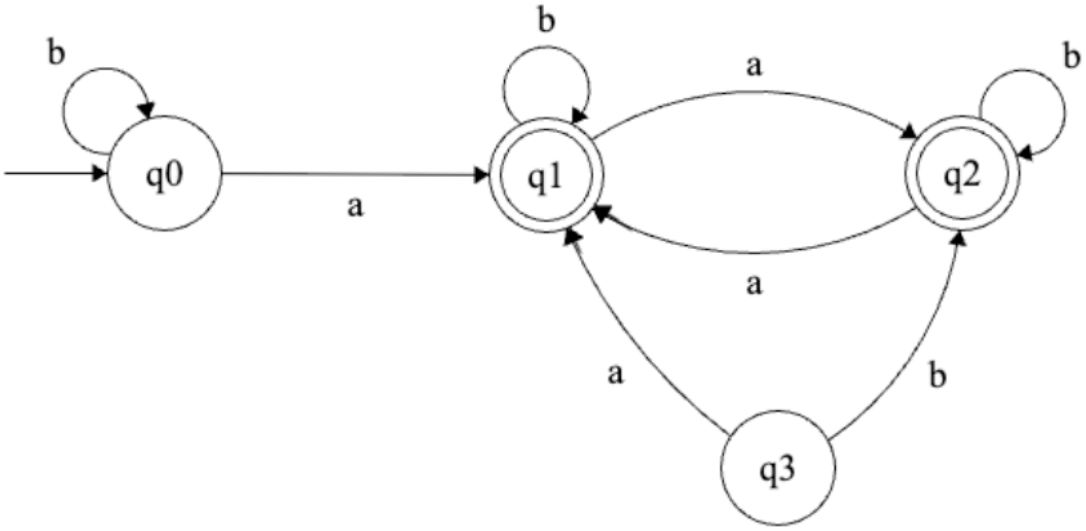


iv. b* + b*a(ba)*

Ans:



3. Consider the following Finite State Machine,



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

Ans: b*a(a+b)*

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

Ans: