University of Management & Technology, LAHORE CAMPUS SST, Department of Computing (CS)

Assignment# 1: TOA

Instructor: Rana Marwat Hussain

Name # **Maheen Aslam** STD ID# **F2021266378** **Total Marks: 20**

Note: (A) Attempt all Questions.

(B) Each question contains marks. Marks distribution explanation + formal working = total marks of one part. (C) Zero marks for plagiarism if found no tolerance policy as per the HEC & Department of CS UMT.

Q1. Section Based on DFA, NFA, RE & Basics of FA. A Part:

Create a DFA which Accepts all the Languages String which starts with even number of 1's and ends with even numbers of 2's.

1) Set of input alphabets

   ∑={1,2}

2) Set of states final and start

   Q={q0,q1,q2,q3,q4,q5} start state ={q0} F={q4}

3) RE

   (11)*(1+2)*(22)*

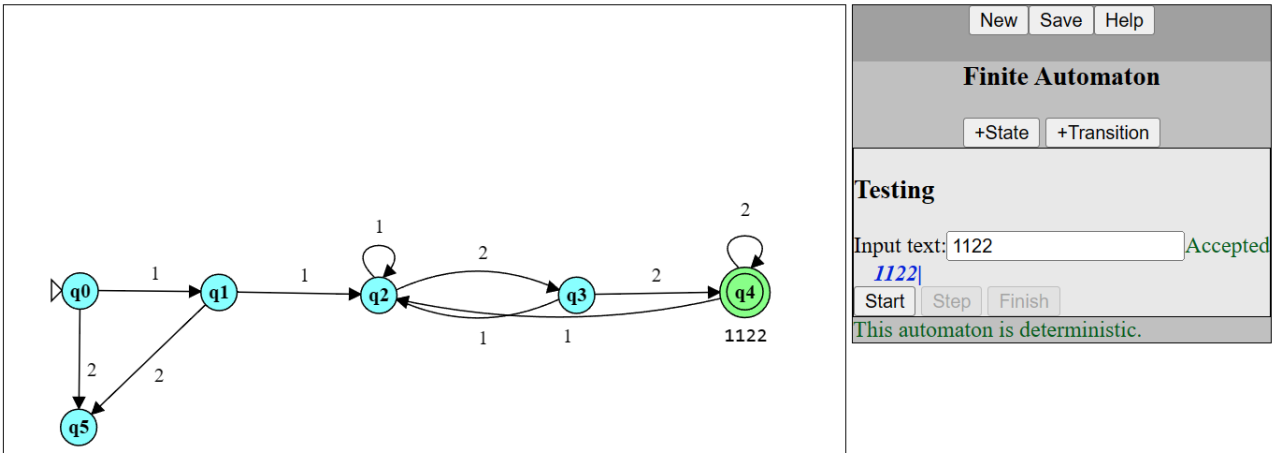
4) Transition function general

   δ:Q*∑→Q

5) DFA using Online tool. You need to design your DFA on the given link (you will find tool there and all the help you need to design your solution and verify it). Attached screenshot. 4 marks Online Tool Link Please Click here

Formal Language Editor

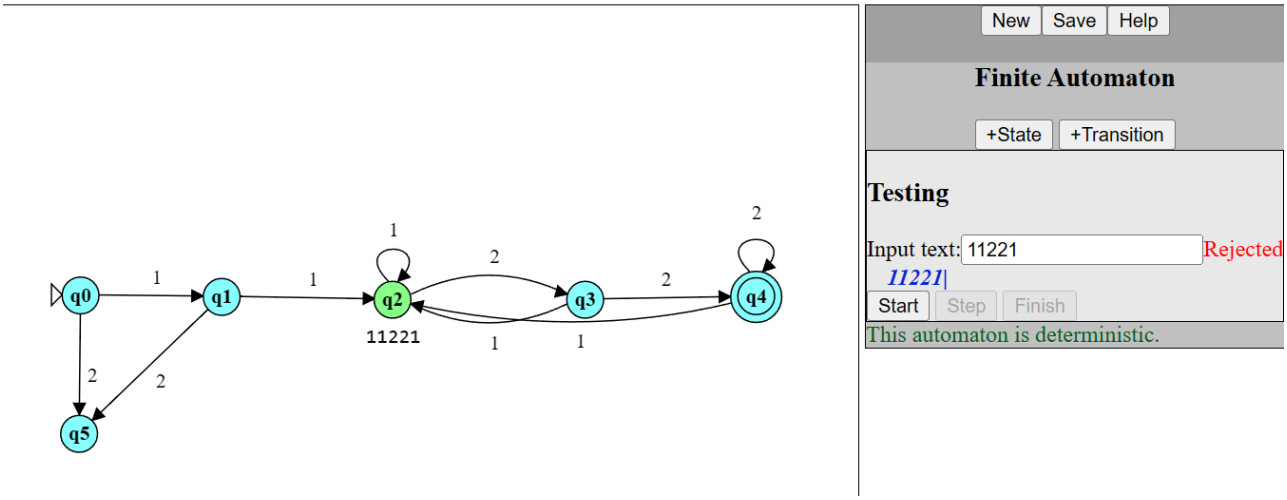
Anonymous



6) Also run it on the input string generated from the RE for verify DFA acceptance & Rejection. Attached screenshot.

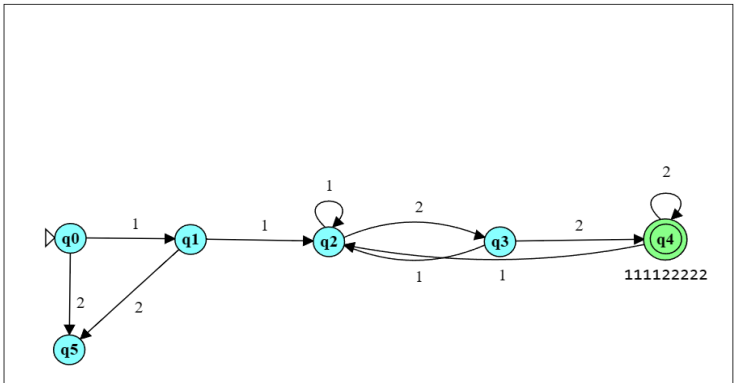
Formal Language Editor

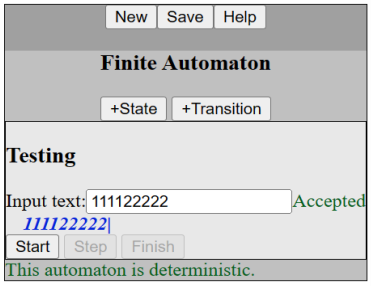
Anonymous



Formal Language Editor

Anonymous





B Part:
Create a NFA which Accepts all the Languages String which starts with a, b, & c only and ends with even numbers of k's.

1) Set of input alphabets

   ∑={a,b,c,k}

2) Set of states final and start

   Q={q0,q1,q2,q3} startstate={q0} F={q2}

3) RE

   (a+b+c)(kk)*

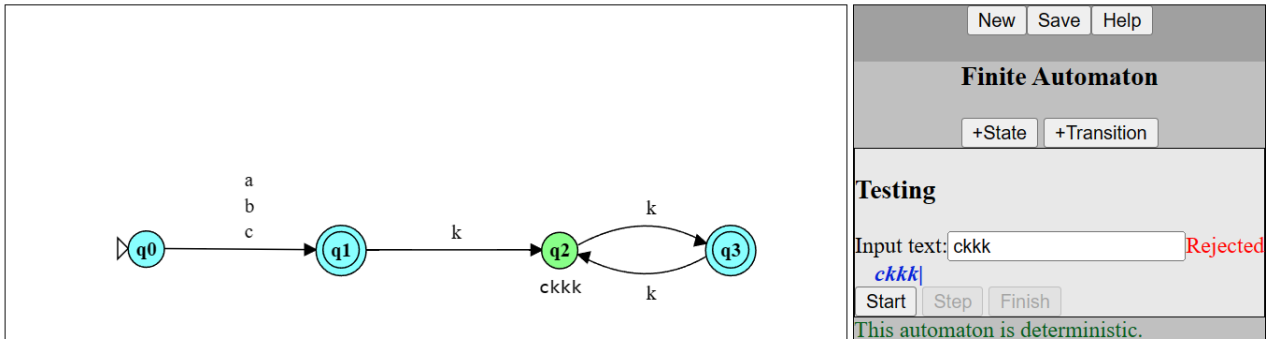
4) Transition function general

   δ:Q*∑→2^Q

   δ:{q0,q1,q2} *{a,b,c,k}→2^Q

5) NFA using Online tool. You need to design your DFA on the given link (you will find tools there and all the help you need to design your solution and verify it). Attached screenshot. 4 marks Online Tool Link Please Click here

Anonymous



6) Also run it on the input string generated from the RE for verify DFA acceptance & Rejection. Attached screenshot.

L={a,b,c,akk,akkkk,akkkkkk,bkk,bkkkk,ckk,ckkkk…..}

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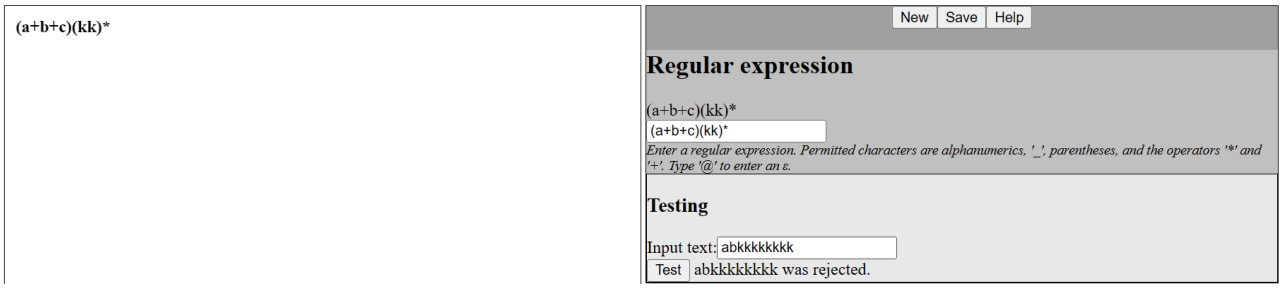

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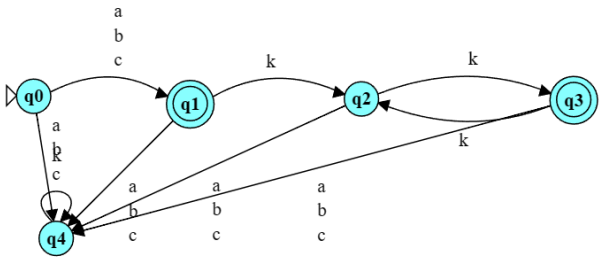
Because even no k's include 0.

DFA:



Finite Automaton

+State +Transition

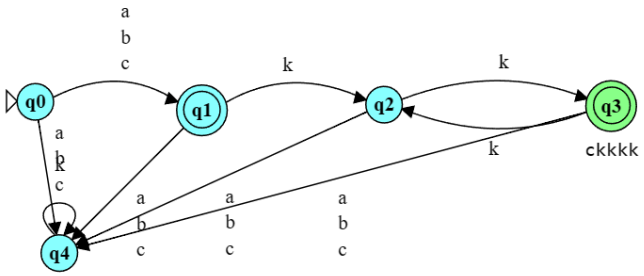
Testing

Input text: akkkkkkaakkkk Rejected

akkkkkkaak|kkk

Start Step Finish

This automaton is nondeterministic.



Finite Automaton

+State +Transition

Testing

Input text: ckkkk Accepted

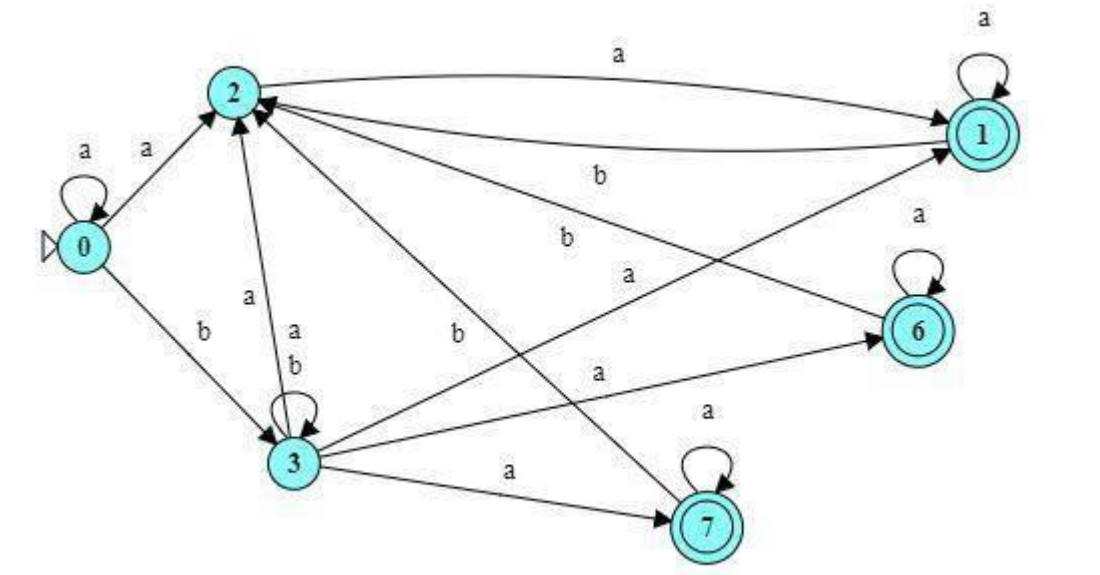
ckkkk|

Start Step Finish

This automaton is nondeterministic.

Q2. Section Based on NFA to DFA. **10 marks**

Convert the NFA to DFA if possible, with complete steps.



Transition table:

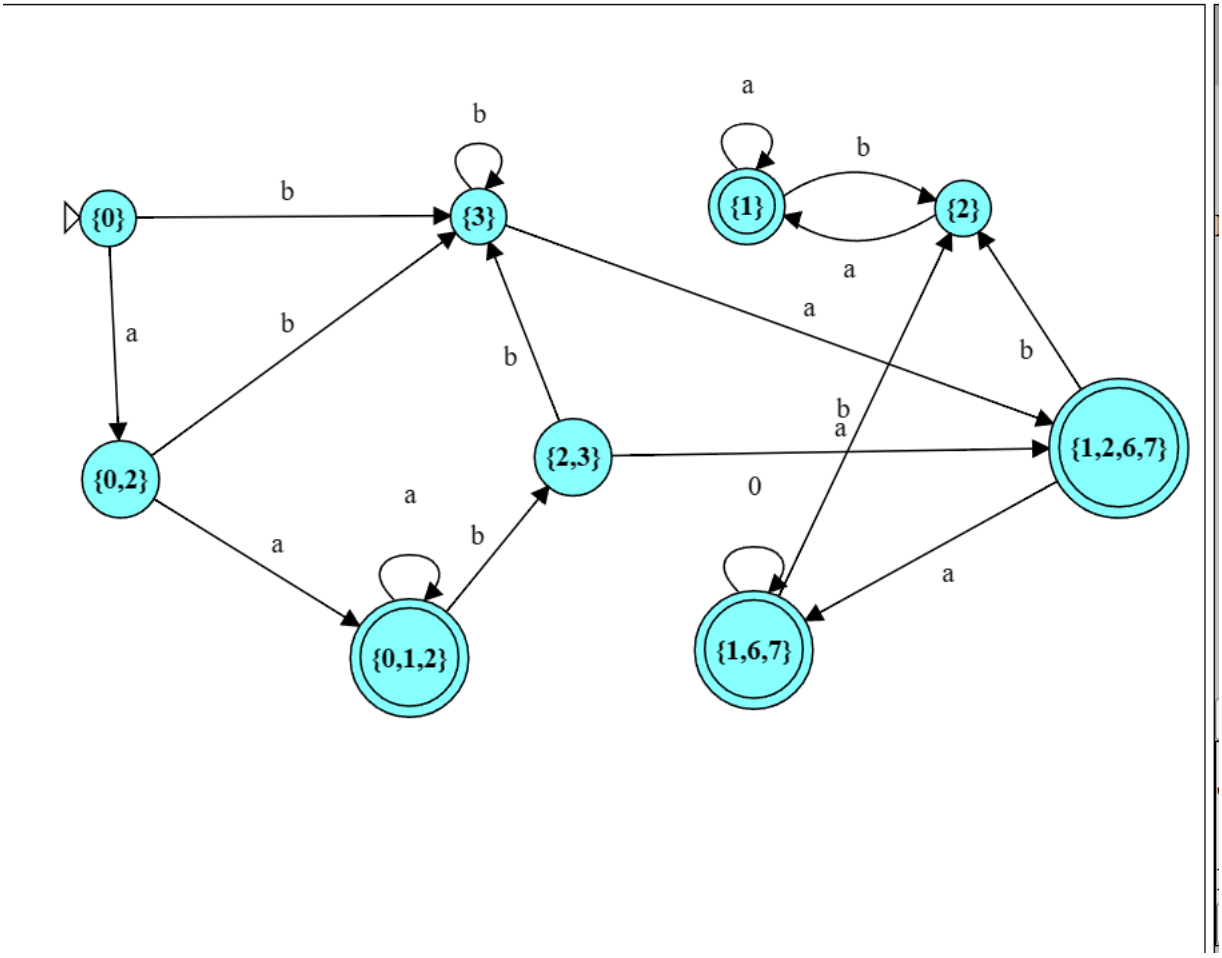
Present state	**Input a**	**Input b**
0	{0,2}	{3}
2	{1}	{∅}
3	{1,2,6,7}	{3}
1	{1}	{2}
6	{6}	{2}
7	{7}	{2}

Equivalnce DFA Transition table:

Present state	**Input a**	**Input b**
{0}	{0,2}	{3}
{0,2}	{0,1,2}	{3}
{0,1,2}	{0,1,2}	{2,3}
{3}	{1,2,6,7}	{2,3}
{2,3}	{1,2,6,7}	{3}
{1,2,6,7}	{1,6,7}	{2}
{1,6,7}	{1,6,7}	{2}
{2}	{1}	{∅}
{1}	{1}	{2}

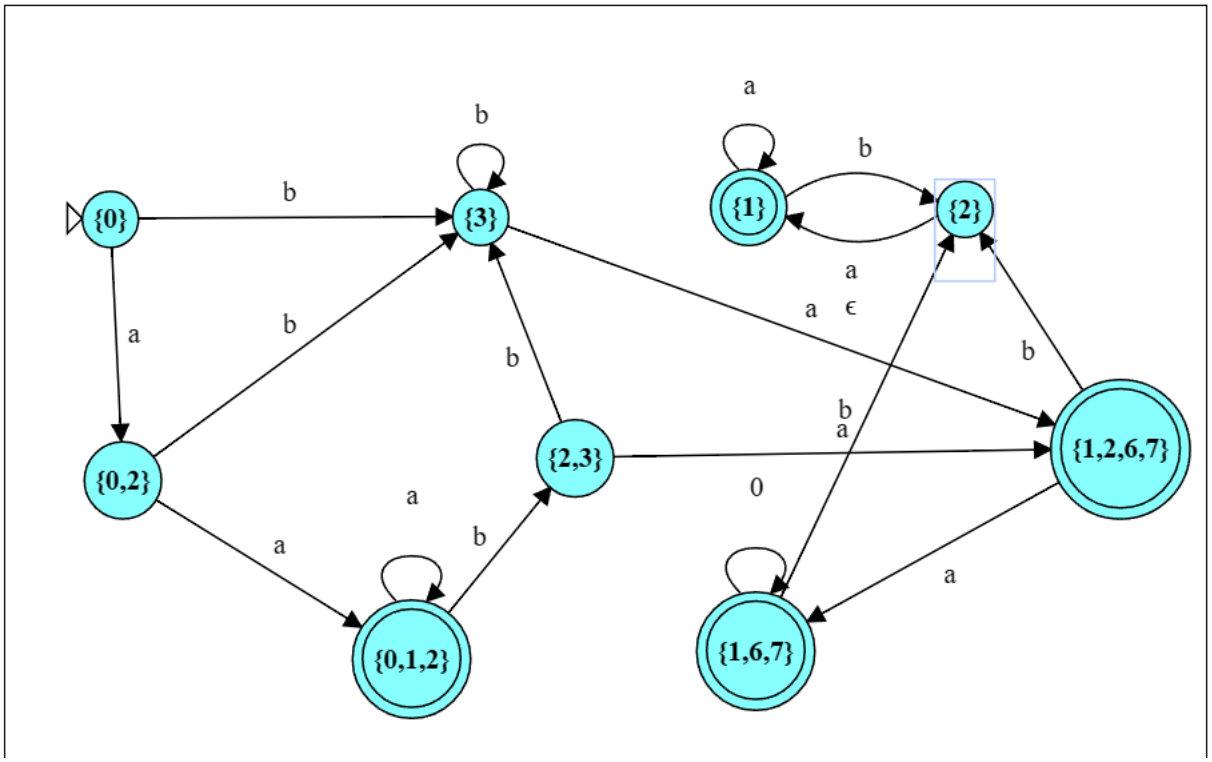
Formal Language Editor

Anonymous



Formal Language Editor

Anonymous



OR

[Click on Tool Created Model]