COMP-4200

Formal Languages

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DATE: September 27, 2021

LAB SECTION: 001

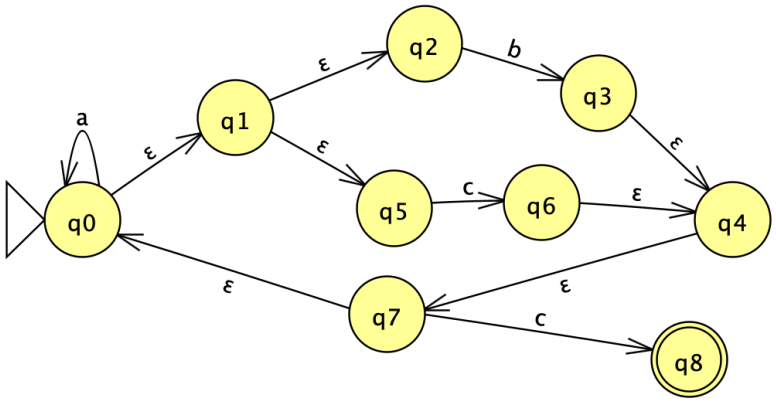
Homework #4

Problem 1

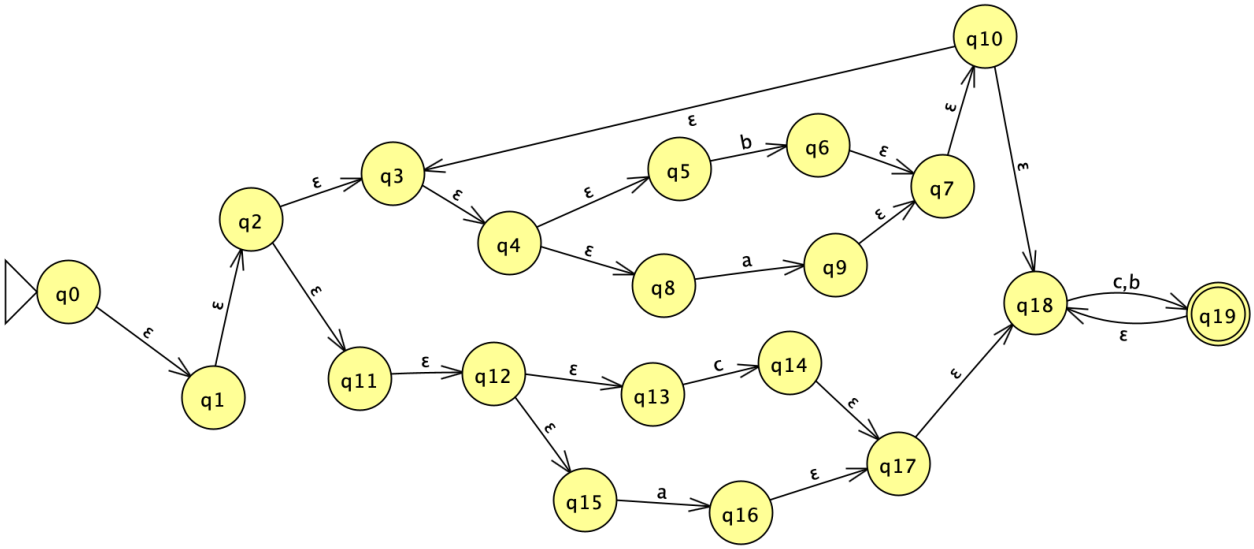
10 points

Convert the following regular expressions into equivalent NFAs. Draw the final NFAs using JFLAP. That is, provide JFLAP screenshots/drawings of the diagrams in your solution. Hand-drawn drawings will be NOT graded.

1. a* (b $\cup$ c)* c



2. ((b $\cup$ a)* $\cup$ (c $\cup$ a))*(cb)*



Problem 2

20 points

Convert the following NFAs into equivalent regular expressions. Show **all the intermediate steps** (i.e. GNFAs) and make appropriate comments to help graders understand your steps.

For example, step 1: remove state "q0"; step 2: remove state "q3", etc.

For this problem, it is not necessary to use JFLAP.

a. Convert the NFA in Figure 1 into an equivalent regular expression.

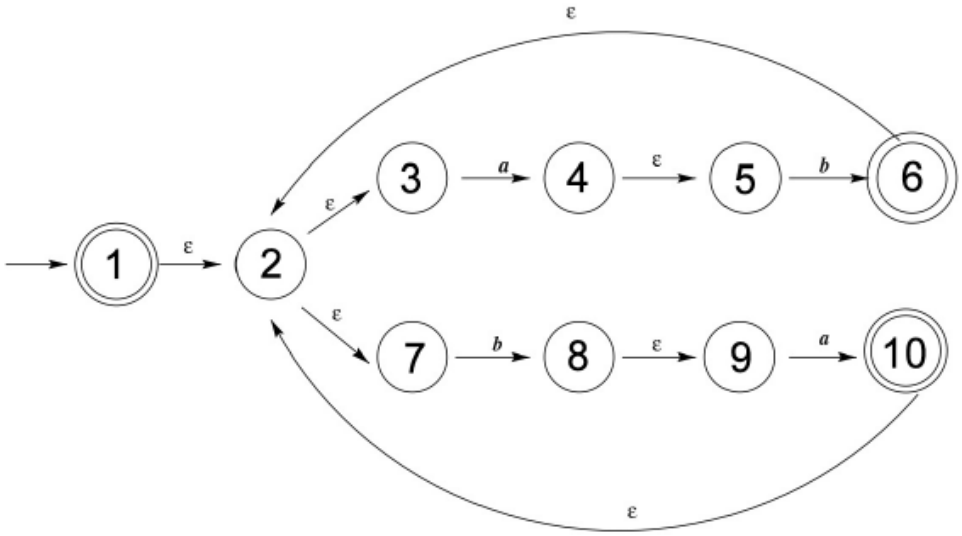


Figure 1:

→ STEP 1: REMOVE STATES 4-7 TO JOIN STATES 3 AND 8

→ STEP 2: REMOVE STATES 10 TO JOIN STATES 9 AND 11

→ STEP 3: REMOVE STATES 13 AND 14 TO JOIN 12 WITH 15

→ STEP 4: REMOVE STATES 2 AND 3 AS WELL AS STATES 9, 12, & 15

» REGULAR EXPRESSION: $\epsilon + (ab)^* + (\text{ba})^*$

b. Convert the NFA in Figure 2 into an equivalent regular expression.

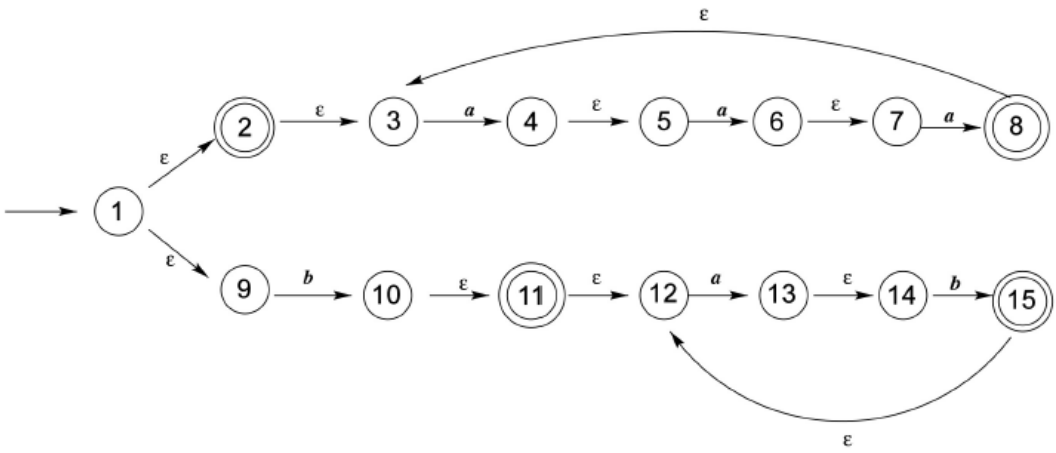


Figure 2:

→ STEP 1: REMOVE STATES 5 & 9

→ STEP 2: REMOVE STATES 3 & 7

→ STEP 3: JOIN STATES 3 WITH 6 TO MERGE a→b

→ STEP 4: JOIN STATES 7 & 10 TO MERGE b→a

→ STEP 5: REMOVE STATES 2, 6, 10, & 4

» REGULAR EXPRESSION: (ab + ba)*