

# **4200 - Formal Languages: Solution to Homework #4**

Due on Sep 24, 2018 at 2:00pm

*Instructor: Dr. Anh Nguyen*

## Problem 1

10 points

Convert the following regular expressions into equivalent NFAs. Draw the final NFAs.

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

**Solution:**

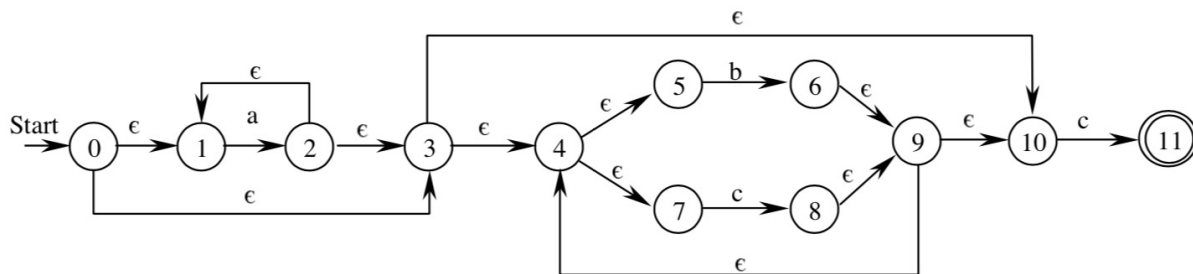


Figure 1: NFA for question 1.

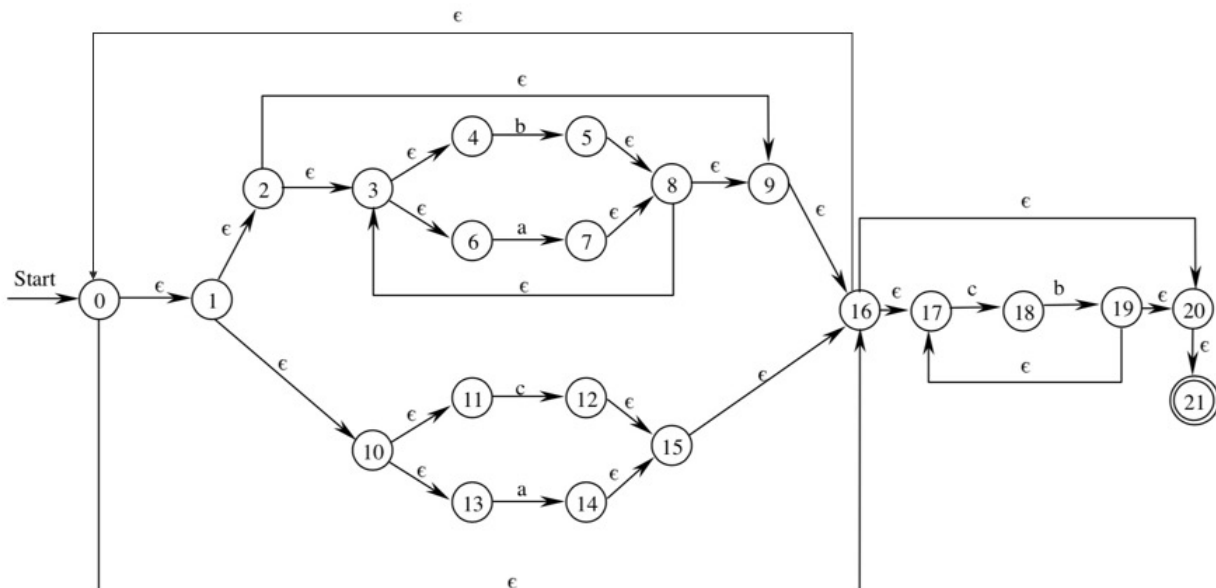


Figure 2: NFA for question 2.

## Problem 2

20 points

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

- a. Convert the NFA in Figure 3 into an equivalent regular expression.

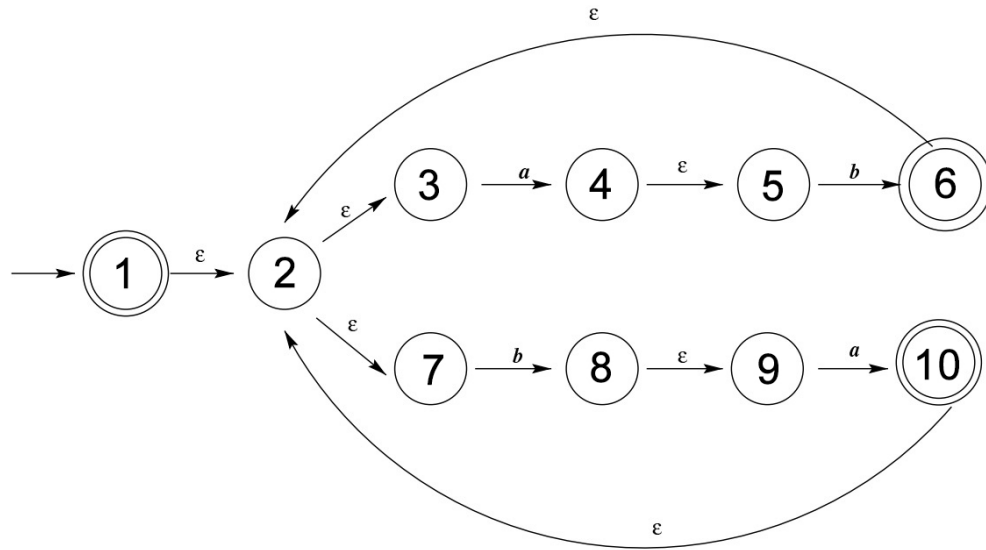


Figure 3:

**Solution:** A regular expression for the above NFA is  $(ab + ba)^*$ .

b. Convert the NFA in Figure 4 into an equivalent regular expression.

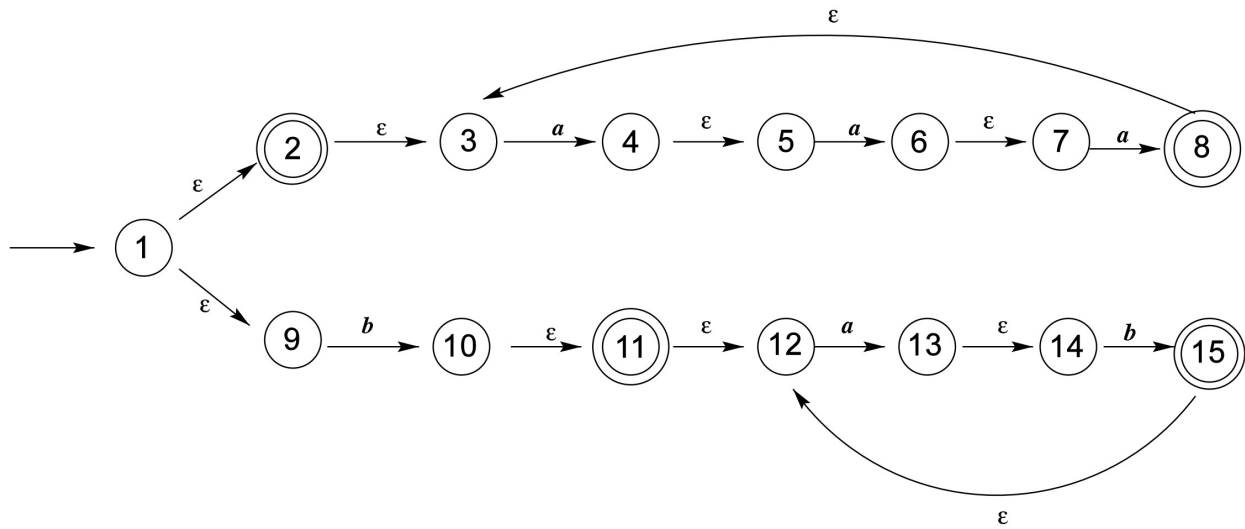


Figure 4:

**Solution:** A regular expression for the above NFA is  $(aaa)^* + b(ab)^*$ .