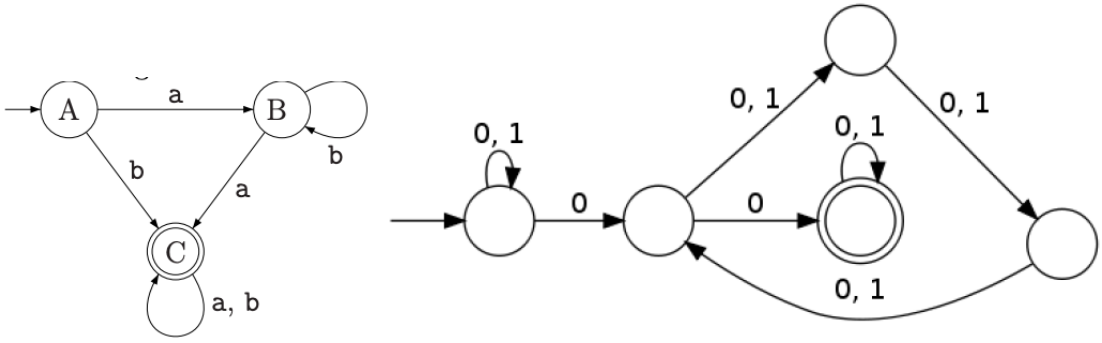
CS21004 - Tutorial 4

January 28th, 2019

Instructions: For the problems with (To submit), please write the answers neatly in loose sheets and submit to the TA before the end of the tutorial.

1. Design NFAs for the following regular expressions over $\Sigma = \{a, b\}$:
   a. $(aa^* + aba^*b^*)^*$
   b. $(ab(a + ab)^*(a + aa))$ (To submit)
2. Consider the following NFAs. Draw regular expressions corresponding to these. (Submit the second)



3. Find the regular grammars for the following languages on $\{a, b\}$
   a. $L = \{w : n_a(w)$ and $n_b(w)$ are both even$\}$ (To submit)
   b. $L = \{a^n b^m : n \geq 2, m \geq 3\}$
4. Find the regular expressions for the following languages on $\{a, b\}$
   a. $L = \{a^n b^m : n \geq 4, m \leq 3\}$.
   b. The complement of L in 4-(a).
   c. All strings that do not end with `aa`. (To submit)
   d. All strings that contain an even number of b-s. (To submit)
   e. All strings which do not contain the substring `ba`. (Home)

5. Consider the regular expression $R = (aa)^* + b^*$ (Home).

    a. Draw an NFA of the above regular expression with not more than 4 states.

    b. Draw the equivalent DFA.

    c. Find R' which recognizes the complement of language recognized by R.

6. Provide an algorithm for converting a left linear grammar to a right linear grammar. (Home)