

B.tech. IV Sem (C) (CSE), 2019-20

Theory of Computation, Assignment # 2

February 23, 2020

1. Show that regular languages are closed on :
 - (a) union, and
 - (b) *complementation*.
2. Explain the principle of *Pumping lemma*. What are its applications.
3. What are the important properties of Regular languages?
4. Explain the process of checking whether a language is **not** regular, making use of pumping lemma.
5. Explain the Arden's theorem. What are its applications?
6. Answer in brief.
 - (a) What is complements automaton?
 - (b) How do you convert regular expression into automaton?
 - (c) How do you convert automaton into regular expression?
 - (d) Pumping Lemma can be applied to only the languages that are infinite languages (True/False).
 - (e) Pumping-lemma is only sufficient for testing non-regularity of all languages (True/False).
7. Are the regular languages closed under these operations?
 - (a) Infinite union
 - (b) Infinite concatenation
 - (c) Difference
 - (d) Symmetric difference
 - (e) Complementation
8. Justify whether, following statements are true or false.
 - (a) If L is regular, then $\{xy\}$ is regular, where $x, y \in L$.
 - (b) If L is regular, then $\{y\}$ is regular, where $y = x^R$ and $x \in L$.
 - (c) If L is regular, then L_1 is also regular for $L_1 \subseteq L$.
9. Use pumping lemma to show that following languages are not regular:
 - (a) $\{ww^R \mid w \in (a+b)^*\}$
 - (b) $\{ww \mid w \in (0+1)^*\}$
 - (c) $\{w \mid w \text{ is a Palindrome String}\}$

10. Find out the regular expressions using Arden's rule, for the transition diagram shown in Fig. 1 (a), and (b).

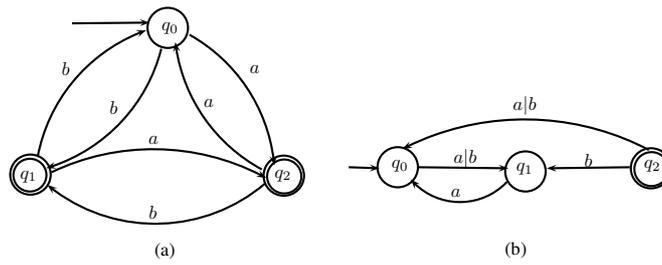


Figure 1: DFAs

11. Find the regular expression for the automaton shown in the Fig. 2.

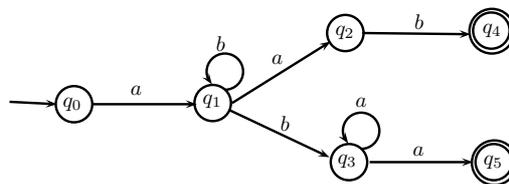


Figure 2: Finite automaton

Submission deadline: 04-03-2020. The assignment must be done in a register and be submitted in the class. The same will be returned after checking, in next class.