CLEMSON UNIVERSITY, SCHOOL OF COMPUTING
CPSC 3500 FOUNDATIONS OF COMPUTER SCIENCE

Assignment 3: Finite Automata

Return by 11:59pm, 9/24/2019

Problem 1 60%

Choose any 4 items out of a-h: For each of the following languages, draw an FA accepting it.

(a) $\{a,b\}^*\{a\}$

(b) $\{bb,ba\}^*$

(c) $\{a,b\}^*\{b,aa\}\{a,b\}^*$

(d) $\{bbb,baa\}^*\{a\}$

(e) $\{a\}\cup\{b\}\{a\}^*\cup\{a\}\{b\}^*\{a\}$

(f) $\{a,b\}^*\{ab,bba\}$

(g) $\{b,bba\}^*\{a\}$

(h) $\{aba,aa\}^*\{ba\}^*$

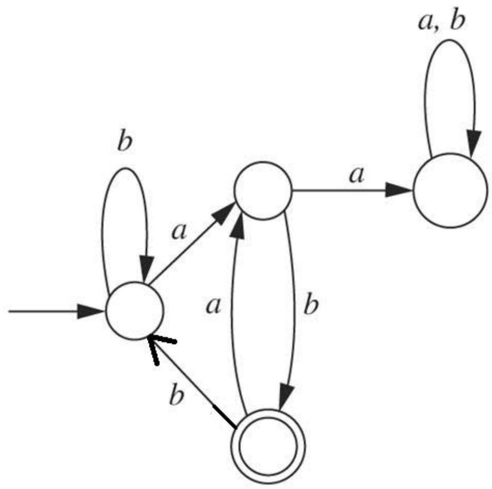

Figure 2.1: FA for $L_1 \cap L_2$

Problem 2 20%

$$L_1 = \{x \in \{a,b\}^* | aa \text{ is not a substring of } x\}; \quad L_2 = \{x \in \{a,b\}^* | x \text{ ends with } ab\}.$$

For the FA (Figure 2.1) that accepts $L_1 \cap L_2$, prove that there cannot be any other FA with fewer states accepting the same language.

Problem 3 20%

Suppose L is a subset of $\{a,b\}^*$. If $x_0, x_1, \ldots$ is a sequence of distinct strings in $\{a,b\}^*$ such that for every $n \geq 0$, x_n and x_{n+1} are L-distinguishable, does it follow that the strings $x_0, x_1, \ldots$ are pairwise L-distinguishable? Either give a proof that it does follow, or find an example of a language L and strings $x_0, x_1, \ldots$ that represent a counterexample.