

University of Nevada, Las Vegas Computer Science 456/656 Fall 2023

Answers to Assignment 2: Due September 8, 2023

1. Identify which machine accepts the language defined by each regular expression.

(a) $a^* + b^*$ Ans: M_7

(b) λ Ans: M_2

(c) a^* Ans: M_3

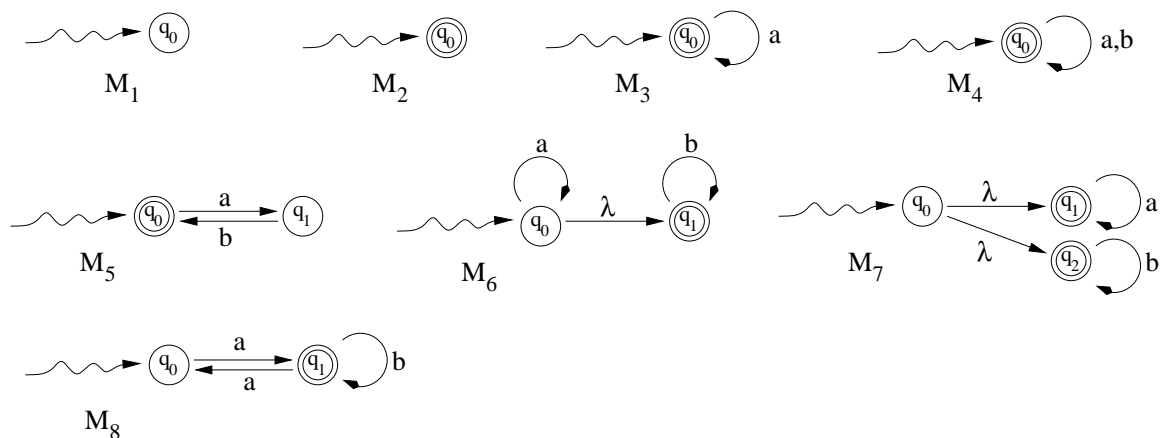
(d) \emptyset Ans: M_1

(e) $a(aa + b)^*$ Ans: M_8

(f) a^*b^* Ans: M_6

(g) $(a + b)^*$ Ans: M_4

(h) $(ab)^*$ Ans: M_5



2. True or False.

(a) **T** If L is any language, $L + L = L$

(b) **T** If L is any language, $L \cap L = L$

(c) **T** If L is any language, $\{\lambda\} \in L^*$.

3. Let $L_1 = \{a, ab\}$ and $L_2 = \{a, ba\}$. How many strings are there in the language L_1L_2 ? Ans: Three.
 $L_1L_2 = \{aa, aba, abba\}$

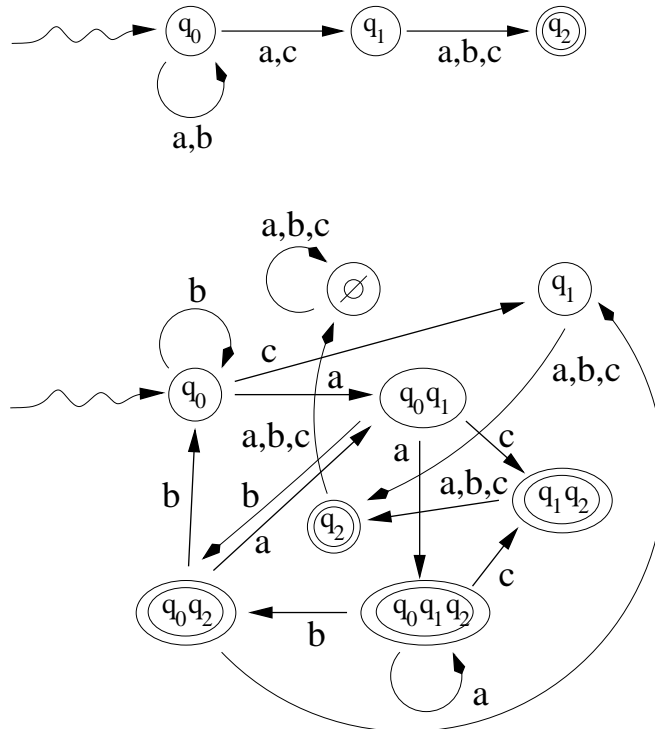
4. True or False. These are harder.

(a) **T** Any language consisting of all decimal numerals of an arithmetic sequence (for example: $\{5, 13, 21, 29, \dots\}$) is regular.

(b) **T** Let L be a regular binary language. Let L' be the language of all strings obtained from members of L by substituting ab for 0 and c for 1. Then L' must be regular. For example, if $L = \{0, 10, 10011\}$ then $L' = \{ab, cab, cababcc\}$.

5. Any NFA with n states is equivalent to some DFA with at most 2^n states, counting the dead state.

Draw a DFA equivalent to the following three state NFA. It is not necessary to draw the dead state.



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