University of Nevada, Las Vegas Computer Science 456/656 Fall 2024

Assignment 2: Due Tuesday January 30, 2023, 11:59 PM

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. You will receive a message from the graduate assistant, Zachary Edwards, telling you how to turn in the assignment.

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

   (a) $a^* + b^*$

   (b) λ

   (c) a^*

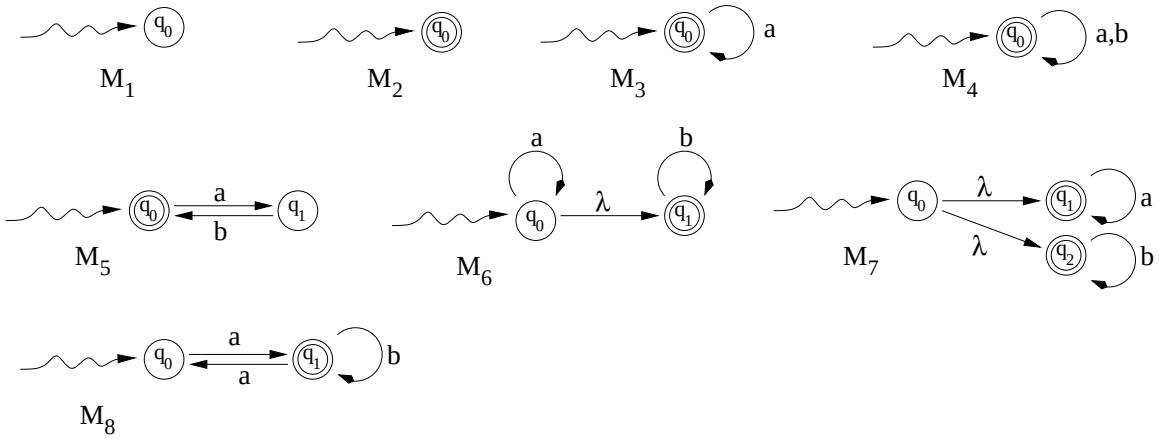
   (d) $\emptyset$

   (e) $a(aa + b)^*$

   (f) a^*b^*

   (g) $(a + b)^*$

   (h) $(ab)^*$



2. True or False.

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

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

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

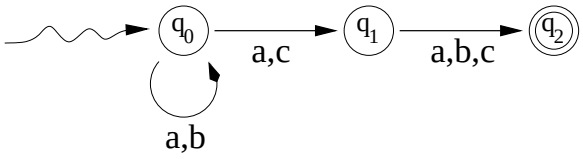
3. Let $L_1 = \{a, ab\}$ and $L_2 = \{a, ba\}$. How many strings are there in the language L_1L_2? _____ How many strings are there in the language L_2L_1? _____

4. True or False. These are harder.

   (a) _____ Any language consisting of all decimal numerals of an arithmetic sequence (for example: $\{5 + 8n : n \geq 0\} = \{5, 13, 21, 29, 37, 45 \ldots\}$) is regular.

   (b) _____ 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. For just this problem, include the dead state in your figure.



   Show your work.