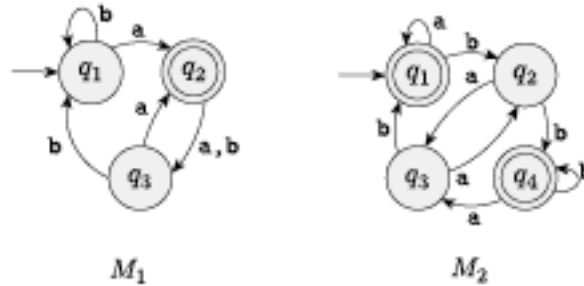


Assignment 1: Formal Language Theory

Due March 21st, 2018

Question 1

The following are the state diagrams of two FSAs, M_1 and M_2 . Answer the following questions about each of these machines.



Question 1a

- (1)
 - a. What is the start state?
 - b. What is the set of accept states?
 - c. What sequence of states does the machine go through on input $aabb$?
 - d. Does the machine accept the string $aabb$?
 - e. Does the machine accept the string ϵ ?

Question 1b

Give the formal descriptions of M_1 and M_2 (i.e. descriptions of the form $\langle Q, \Sigma, \delta, q_0, F \rangle$).

Question 2

Give state diagrams of DFAs recognizing the following languages. In all parts, the alphabet is $\{0,1\}$.

- (2)
 - a. $\{w \mid w \text{ begins with a } 1 \text{ and ends with a } 0\}$
 - b. $\{w \mid w \text{ has length at least } 3 \text{ and its third symbol is a } 0\}$
 - c. $\{w \mid w \text{ contains at least two } 0\text{s and at most one } 1\}$

Question 3

Define an infinite subset of English or French (different from the one that we saw in class) that you think cannot be generated by a regular grammar/finite state automaton. Briefly explain why it is not regular (i.e. what kind of structure does it have?).

- How would you go about showing that English (or French) is not regular using the fragment that you have defined?