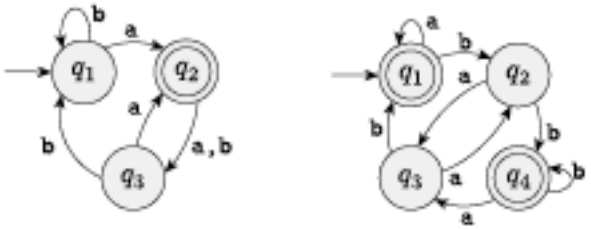
Assignment 1: Formal Language Theory

Due March 27st, 2019

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.



M_1 M_2

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 | w begins with a 1 and ends with a 0}
b. {w | w has length at least 3 and its third symbol is a 0}
c. {w | w contains at least two 0s 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?