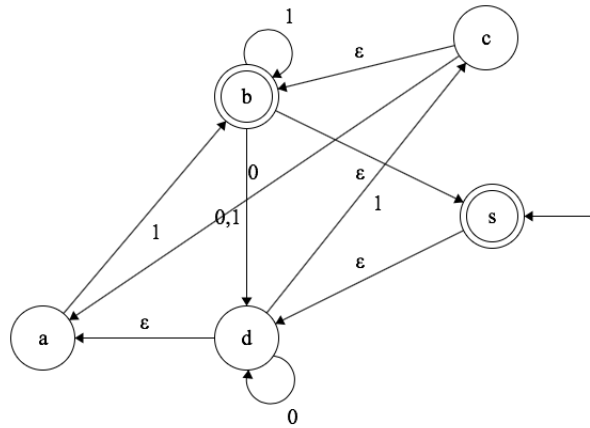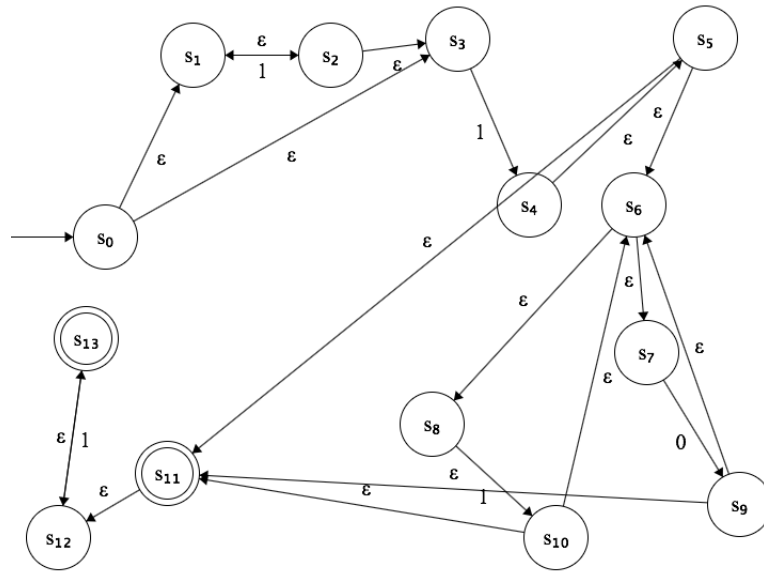# Homework 3

Armand Nasseri
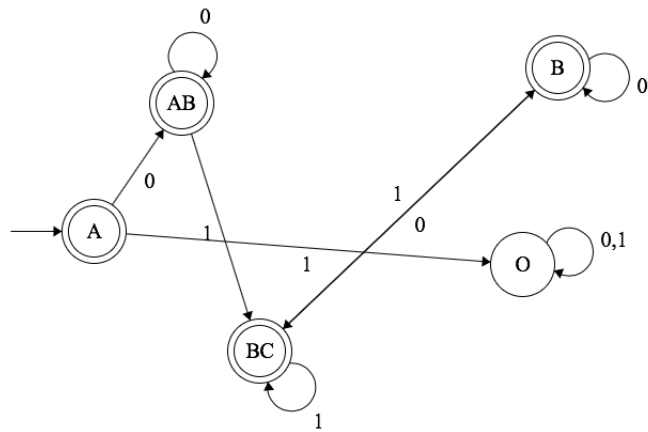
November 3, 2017

1 Problem 1
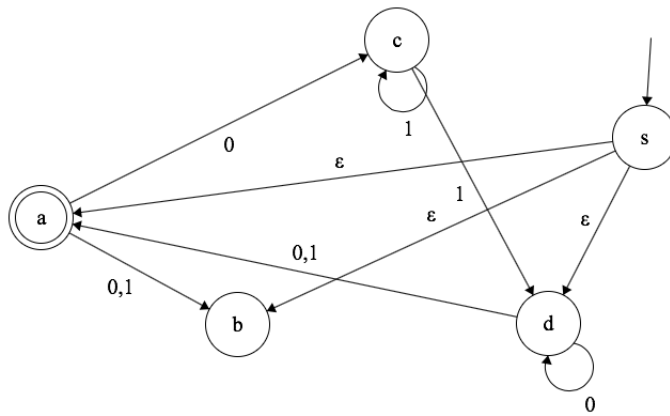
1) NFA star construction

2) Convert regex to NFA
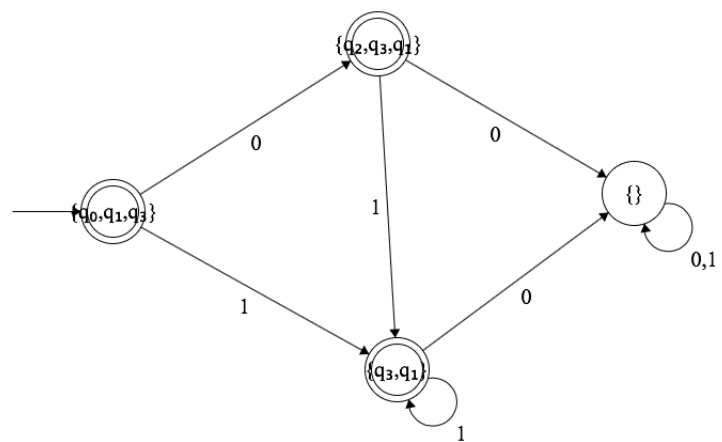
3) Convert NFA to DFA

4) Convert DFA to reverse NFA

DFA/NFA

2   Problem 2

Equivalent DFA for given NFA:

3 Problem 3

The reverse of a DFA is defined by creating a new start state with epsilon transitions that point to the original accepting states and flipping all transition arrows around. To create a reverse DFA:

    1) Create a new start state.

    2) Label the new epsilon transitions and make them point to the accepting states.

    3) Reverse all arrows for each transition in the DFA and remove original start arrow.

    4) Turn the original start state into an accept state.

4 Problem 4

For each ε-transition in the NFA, called it $\delta(q, \varepsilon) = p$, we could replace that by a set of transition $\delta(q, c) = p$ where c is in the outgoing transition from p. If one of the outgoing transition from p is an accepting state, then we make p to be an accepting state.

5 Problem 5

(a) It is not regular by the pumping lemma for the string $w = 0^p 1^p 0^{2p}$, i.e. pumping up the string, we get $xyyz = 0^{p+|y|} 1^p 0^{2p}$ is not in the language.

(b) It is not regular by the pumping lemma for the string $w = 0^p 1^p 0^{2p-1}$, i.e. pumping down the string, we get $xz = 0^{p-|y|} 1^p 0^{2p}$ is not in the language.

(c) It is regular because you can build a regular expression for it, i.e. $R = 0^* 1^*$.

(d) It is regular because you can build a regular expression for it, i.e. $(00)^*(11)^*|0(00)^*1(11)^*$.

(e) It is regular because you can build a regular expression for it, i.e. $0(0|1)^*0|1(0|1)^*1$

(f) It is not regular by the pumping lemma for the string $w = 0^{p+1} 1^p \in A$ but when pumping down $xz = 0^{p+1-|y|} 1^p \notin A$.