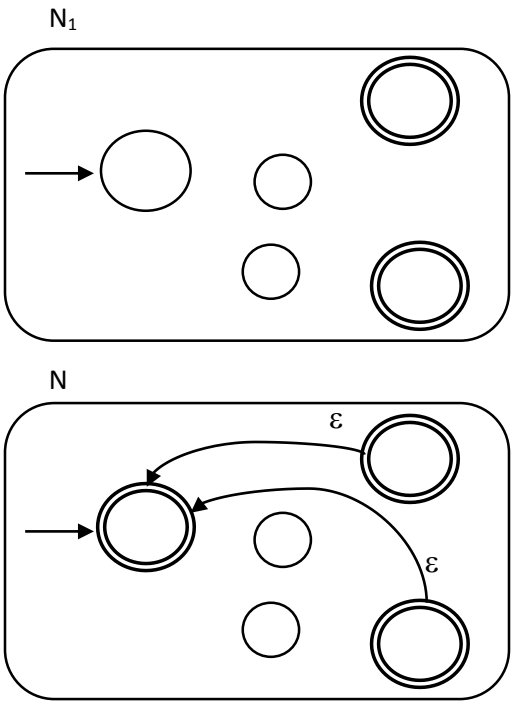
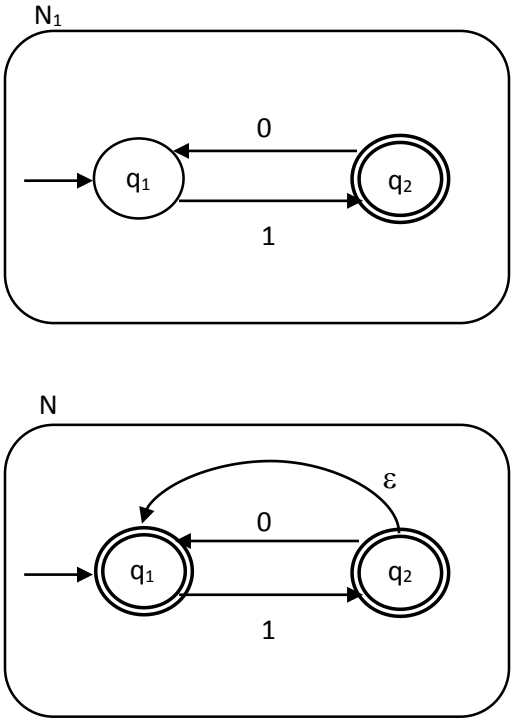
Bradley White
HW #2
CSCI 338
2-5-2016

1. 1.15, p.85



Using $\Sigma_\varepsilon = \{0,1\}$ and N_1 recognizing $A_1 = 1(01)^*$ produces the following NFAs:



The NFA N_1 will accept A_1 however N has the same alphabet and is supposed to recognize $A_1^* = (1(01)^*)^*$, but N will also recognize the string 10, which is not in A_1^*, thus this construction fails to prove closure under the star operation.

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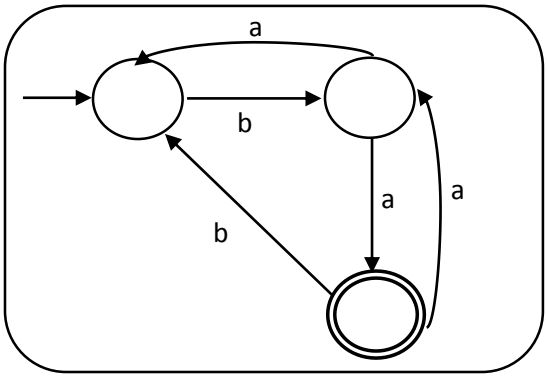
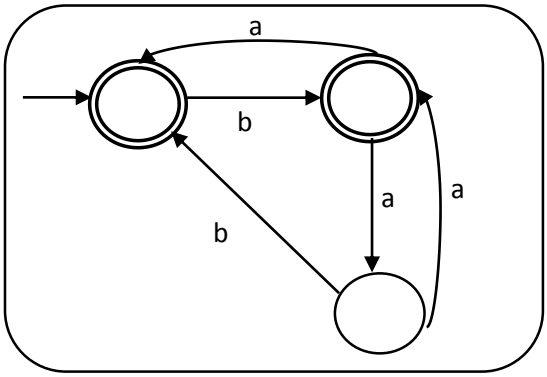
2.

Since D_2 is the complement of D_1, D_2 will accept any strings in Σ which D_1 rejects. So we simply have to switch accept states in D_1 to non-accept states and likewise switch non-accept states to accept states and the resulting DFA will be D_2. Let $\{a, b\} \in \Sigma$ and be arbitrary elements of the alphabet.

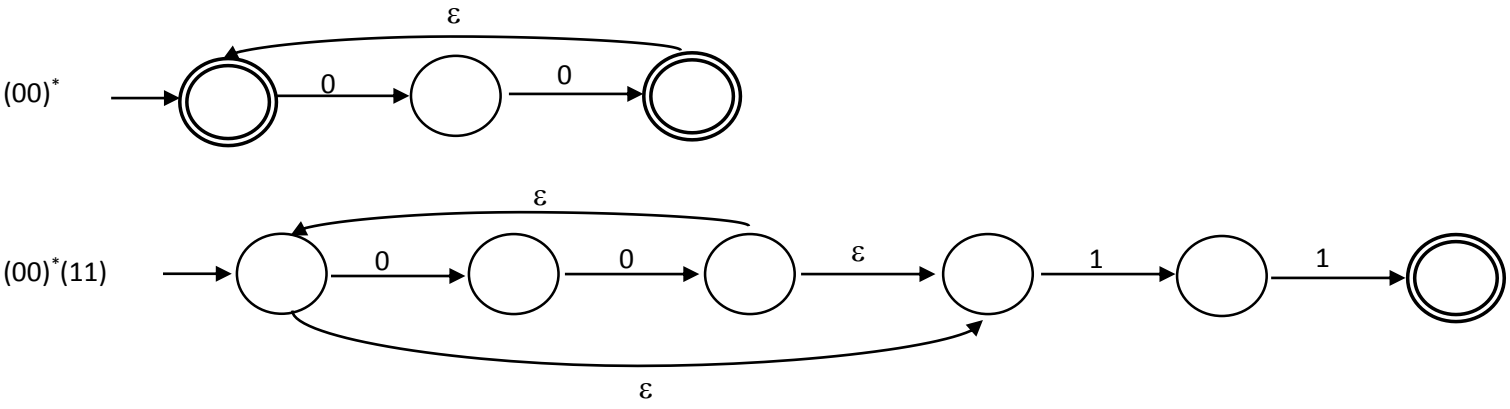
D_1



D_2



3.



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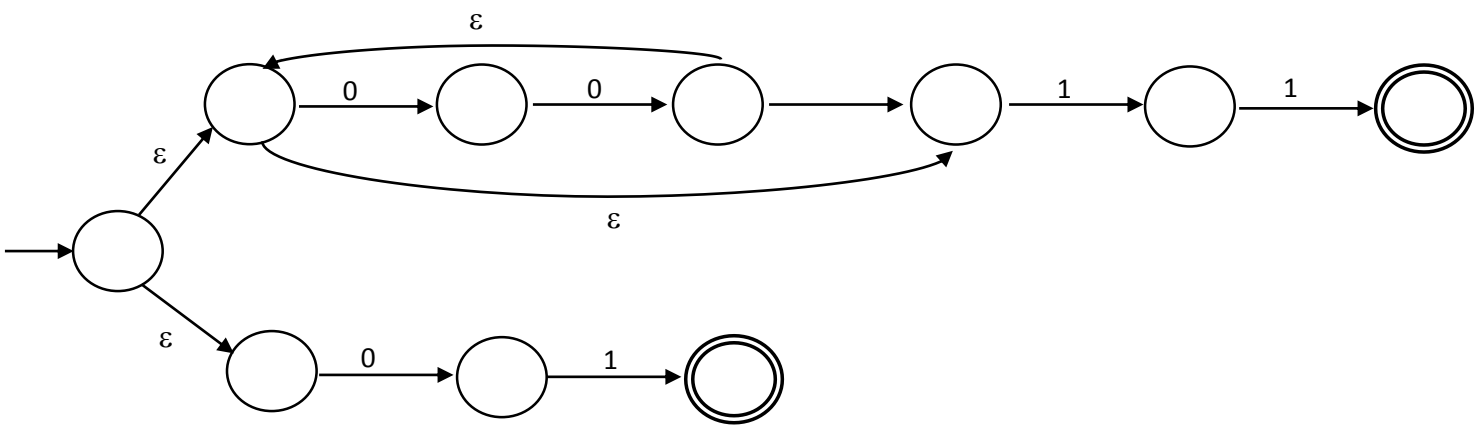
$(((00)^*(11))\cup 01)$



4. 1.20, p.86

b.

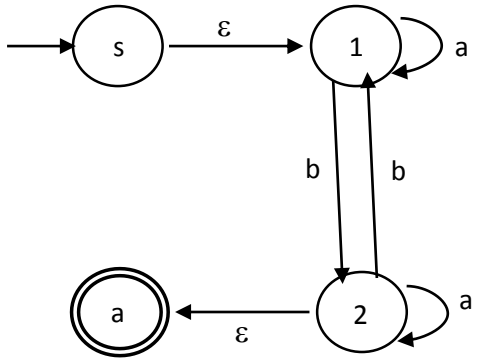
- Members:
  - ababab
  - ab
- Not Members:
  - aaaaaa
  - bbbbb

h.

- Members:
  - aa
  - bab
- Not Members:
  - b
  - Ø

5. 1.21, p.86

a.



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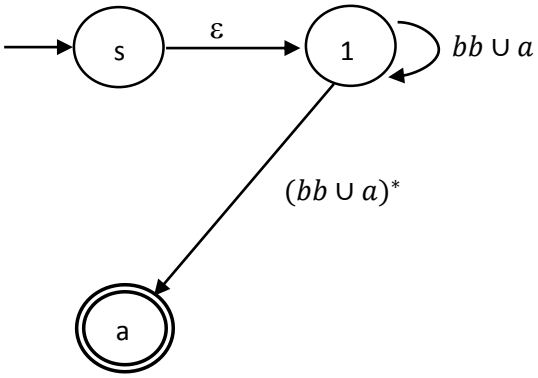

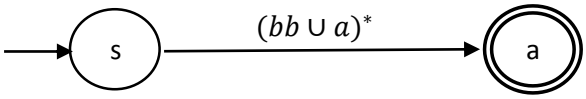

6.