Regular Language Questions

Define NFAs for the following over the alphabet {a,b}

- { w | length(w)=3 or w is all a's }
- {w | w consists of alternating a's and b's}
- {w | w is any string except "aba" }
- { w | w =x●y where x is an even number of a's and y is an odd number of b's }

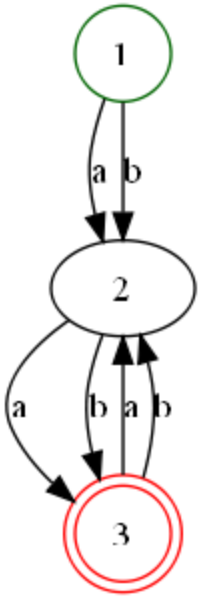
1. Which of the following are correct

A. Every DFA is a NFA.
B. If a language, L, is recognized by a DFA there is an NFA that recognizes L as well.
C. Every NFA is a DFA.
D. Every language is recognized by either an NFA or a DFA.

2. True or False

- The following DFA $(\mathbf{Q}, \Sigma, \delta, \mathbf{q_0}, \mathbf{F})$ recognizes all strings of even length over the alphabet {a,b}

Q = {1, 2, 3}
Σ = {a, b}
δ 1 a -> 2
1 b -> 2
2 a -> 3
2 b -> 3
3 a -> 2
3 b -> 2
$\mathbf{q_0}$ = 1
F = {3}



3. True or False

- S is a prefix of T if there exists another string R, such that S●R = T
- Given a DFA M = $(\mathbf{Q}, \Sigma, \delta, \mathbf{q_0}, \mathbf{F})$ that recognizes the language L. The following is a DFA that recognizes the prefixes of L.
- M_{prefix} = = $(\mathbf{Q}, \Sigma, \delta, \mathbf{q_0}, \mathbf{F_2})$
- $\mathbf{F_2} = \{q \mid q \in Q$ and there is a path from $\mathbf{q_0}$ to $q\}$

4. True or False

- T is a suffix of S iff
  - Exists string Q such that Q●T = S

If W is a regular language, then is the language

{ q | w $\in$ W and q is a suffix of w} regular?

5. Are comments Regular?

- In certain languages, comment appear between delimiters. For example

  /* this is a comment */

Where “/*” and “*/” are the delimiters.

A comment must begin with “/*” and end with “*/” but have no intervening “*/”.

Assume the alphabet = {a,b,*,/}

6. True or False

- Let w^R be the reversal of the string w

- If T is a regular language, is the language
  - $\{ x\, x^R \mid x \in T \}$ regular?