CS 273: Intro to Theory of Computation, Fall 2007
Head-banging 4 (3-5 Oct)

1. **Nonregularity**: Use the closure properties of regular languages to prove that the following language is not regular.

$$L = \{w \mid w \in \{0,1\}^* \text{ is not a palindrome}\}.$$

2. **Context-free grammars**: Give context free grammars for the following languages defined over $\Sigma = \{a, b\}$.

   (a) $L_1 = \{w \mid w$ starts and ends with the same symbol $\}$

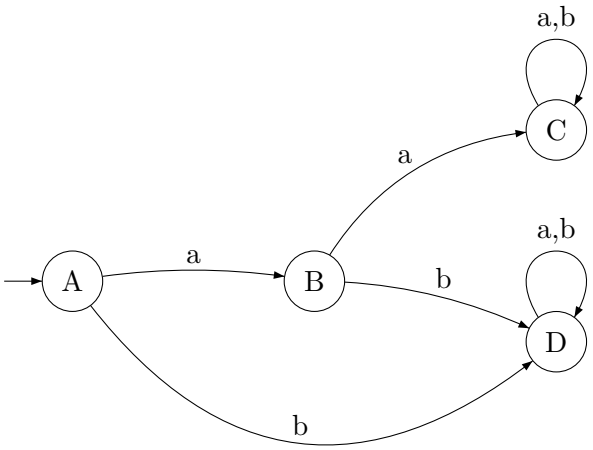
   (b) $L_2 = \{w \mid$ the number of a's in w is equal to the number of b's in $w\}$

3. **Suffix languages**: For any language L, define $SUFFIX(L)$ as follows:

$$SUFFIX(L) = \{y \mid xy \in L, x \in \Sigma^*\}.$$

   (a) Given a DFA M, explain how to modify M to produce an NFA N that recognizes $SUFFIX(L(M))$. Briefly explain the idea of the construction in English and then give the details using tuple notation.

   (b) What is the suffix language for each state in the the following DFA.



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