Homework Assignment 7  
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Due on Dec. 5, 2001 by 1pm

1 Exercise 1

Show whether each of the following languages is regular or not.
   a) $A = 001^n01^n$, where $n \geq 0$.
   b) $B = 001*01*$.
   c) $C = 001^n01^m$, where $n \geq 0$, $m \geq 0$, and $m \neq n$.

2 Exercise 2

For each of the following languages, construct a FSA (deterministic or not) and its corresponding Right Linear Grammar:
   i) \{ab, bb\}
   ii) \{ab, aa, ba, bb\}
   iii) \{w : w is ab, aa, ba or bb followed by any number of bs\}
   iv) a*ab*
   v) \{w : w contains at least one occurrence of a or at least one occurrence of b, in any order\}
   vi) \{w : w contains at most three as\}
   vii) \{w : w contains an odd number of bs\}

3 Exercise 3

The following English sentences illustrate a long distance dependency. Based on this dependency, construct a detailed proof showing that English is not a regular language (cf. Relative Clause proof in class). If the proof relies on the claim that some other language is regular or not regular, prove that claim too.

(1) a. John and Mary like to eat and sleep respectively.
   b. John, Mary, and Sue like to eat, sleep and dance respectively.
   c. John, Mary, Sue, and Bob like to eat, sleep, dance and cook respectively.
   d. Etc.