

CSE 431 Spring 2007

Assignment #8

Due: Friday, June 1, 2007

You final assignment grade will be based on your best 7 out of 8 homeworks.

Reading assignment: Read Sections 8.3-8.5 and 9.1 of Sipser's text.

Problems:

1. Sipser's text: Problem 8.4 (both editions).
2. Sipser's text: Problem 8.11 in the 2nd edition (Problem 8.9 in the 1st edition).
3. Let $EQ_{REG} = \{\langle R, S \rangle \mid R \text{ and } S \text{ are equivalent regular expressions}\}$. Show that $EQ_{REG} \in PSPACE$.
4. A nondeterministic *linear bounded automaton* or NLBA is a variant of a 1-tape *nondeterministic* Turing machine in which the tape head is not allowed to move off the input: if it attempts to move off the right end of the input then it stays where it is just as it did off the left end of the input. (Note that the definition in Sipser's text of LBA's does not allow nondeterminism but the standard definition of LBA's is the one we are calling NLBA's here.) Show that
$$A_{NLBA} = \{\langle M, w \rangle \mid M \text{ is an NLBA that accepts } w\}$$
is PSPACE-complete.
5. Show that $TQBF$ restricted to formulas where the part following the quantifiers is in conjunctive normal form is still PSPACE-complete.
6. (Bonus) Sipser's text: Problem 8.15 (both editions).