CSE 431 Spring 2015
Assignment #8

Due: Friday, June 5, 2015

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

Reading assignment: Read sections 8.4-8.5 and 9.1 of Sipser's text.

Problems:

1. Prove that if every NP-hard language is $PSPACE$-hard then $NP = PSPACE$.

2. Let $EQ_{REX} = \{\langle R, S \rangle \mid R$ and S are equivalent regular expressions$\}$. Show that $EQ_{REX} \in PSPACE$.

3. Let $A_{LBA} = \{\langle M, w \rangle \mid M$ is an LBA that accepts input $w\}$. Show that A_{LBA} is PSPACE-complete.

4. Show that $TQBF$ restricted to formulas where the part following the quantifiers is in conjunctive normal form is still PSPACE-complete.

5. Show that the language A of properly nested parentheses is in L. (For definiteness recall that A is the language generated by the grammar $S \to (S) \mid SS \mid \varepsilon$ though this grammar is not necessarily useful.)

6. (Bonus) Show that the language generated by the following grammar, $S \to (S) \mid [S] \mid SS \mid \varepsilon$ and consisting of all strings with two kinds of balanced parentheses, is also in L.

7. (Bonus) Sipser problem 8.15 (1st or 2nd editions), problem 8.14 (3rd edition).