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 \(EQ_{REX} = \{\langle R, S \rangle \mid R \text{ and } S \text{ are equivalent regular expressions} \}\). Show that \(EQ_{REX} \in PSPACE\).

3. Let \(A_{LBA} = \{\langle M, w \rangle \mid M \text{ is an LBA that accepts input } w \}\). 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 \(S \rightarrow (S) \mid SS \mid \varepsilon\) though this grammar is not necessarily useful.)

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