PROBLEM SET 7
CS 373: THEORY OF COMPUTATION

Assigned: October 25, 2012   Due on: November 1, 2012

Instructions: This homework has 3 problems that can be solved in groups of size at most 3. Please follow the homework guidelines given on the class website; submitions not following these guidelines will not be graded.

Recommended Reading: Lectures 15 through 17.

Problem 1. [Category: Design] If A and B are languages, define $A \diamond B = \{xy \mid x \in A,\ y \in B \text{ and } |x| = |y|\}$. Show that if A and B are regular languages, then $A \diamond B$ is context free. If you construct a CFG or PDA for $A \diamond B$, you need not prove that your construction is correct, but your intuitions behind the construction should be clearly spelt out.

Problem 2. [Category: Proof] Let B be the language of all palindromes over $\{0, 1\}$ containing an equal number of 0s and 1s. Prove that B is not context-free.

Problem 3. [Category: Proof] Let $A = \{wtw^R \mid w, t \in \{0, 1\}^* \text{ and } |w| = |t|\}$. Prove that A is not context-free.