
PROBLEM SET 7

CS 373: THEORY OF COMPUTATION

Assigned: October 17, 2013 Due on: October 24, 2013

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. Solutions not following these guidelines will not be graded.

Recommended Reading: Lectures 14, and 15.

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.