CS 262: Computational Complexity *Instructor: Sandy Irani*

Homework 1

Due: April 16, 2013

1. The definition of 3SAT allows for clauses to have fewer than three literals. We will define a resticted version of 3SAT called EXACT-3SAT in which the literals in each clause must be distinct and every clause must have exactly three literals. (Recall that a *literal* is a variable or the negation of a variable). Prove that 3SAT reduces to EXACT-3SAT.

2. Prove that there exist functions which are not proper.

3. A complexity class C is said to be *closed under reductions* if whenever L reduces to L' and $L' \in \mathcal{C}$, then $L \in \mathcal{C}$. Prove that P and PSPACE are closed under reductions. Is TIME(n^2) closed under reductions? Justify your answer.

4. Show that if $\mathbf{L} = \mathbf{P}$, then $\mathbf{PSPACE} = \mathbf{EXP}$.