HW1

Notes

Due 2012/01/20.

Office hours are holiday-independent. We will have OH on Monday 9th, 6:30pm-8:3pm.

Problem 1

Given:

$\mathrm{E} = \mathrm{DTime}\left(2^{O(n)}\right)$

$\mathrm{NE} = \mathrm{NTime}\left(2^{O(n)}\right)$

Prove:

If $\mathrm{E} \neq \mathrm{NE}$ then $\mathrm{P} \neq \mathrm{NP}$.

Problem 2

Given:

Let Min-Equiv-CNF(f) be the smallest CNF equivalent to f.

CNFs f_1, f_2 are equivalent if:

f_1, f_2 have the same set of variables and

f_1, f_2 have the same set of satisfying assignments.

f_1 is smaller than f_2 if:

$\mathrm{length}(f_1) \leq \mathrm{length}(f_2)$ or

$\mathrm{length}(f_1) = \mathrm{length}(f_2)$ and f_1 appears lexicographically before f_2

The length of a clause is the number of variables in the clause.

The length of a CNF is the sum of the lengths of all clauses.

Prove:

If $\mathrm{P} = \mathrm{NP}$, then Min-Equiv-CNF is solvable in polynomial time.