

Introduction to Complexity Theory

May 7, 2009

Homework 5 (40 points)

- Problem 1: (10 points)
Using the Padding Lemma show that

$$NSpace(n^8) \subsetneq NSpace(n^9)$$

- Problem 2: (10 Points)
Suppose there is an NP Complete problem that takes time $O(n^{\log_2 n})$. Note that this function lies between the polynomials and the exponentials, and is in neither class of functions. What could we say about the running time of any problem in \mathcal{NP} ?
- Problem 3: (20 Points)
Show that the class of languages \mathcal{P} is closed under the following operations:
 - a) Reversal
 - b) Concatenation
 - c) Kleene Star
 - d) Complementation