

Modern Complexity Theory

Spring 2005

Assignment 2

Problem 4 (2 points):

Show that for every set A it holds that $|A| < |2^A|$. (Hint: Try to use the same arguments as in Theorem 2.7 but without using a table since A may not be enumerable.)

Problem 5 (2 points):

Prove that the set of all sets cannot exist.

Problem 6 (2 points):

Show that the intersection of two recursively enumerable languages is recursively enumerable.

Problem 7 (4 points):

Show that the language

$$L = \{\langle M \rangle w : M \text{ started with } w \text{ does not accept}\}$$

is not recursive. (Hint: Try to construct a TM so that if L was recursive, then also L_d would have to be recursive, which is a contradiction.)