

Theory of Computation

Homework 1

Due: 2011/10/04

Problem 1. Two disjoint languages \mathcal{L}_1 and \mathcal{L}_2 are called recursively separable if there exists a recursive language \mathcal{R} such that $\mathcal{L}_1 \cap \mathcal{R} = \emptyset$ and $\mathcal{L}_2 \subseteq \mathcal{R}$. Suppose \mathcal{L}_1 and \mathcal{L}_2 are recursively separable languages. Show that if both \mathcal{L}_1 and $\bar{\mathcal{L}}_1 \cup \mathcal{L}_2$ are recursively enumerable, then \mathcal{L}_1 is recursive.

Problem 2. Prove that the subsets of distinct primes form an uncountable set.