

Problem Set 5

CS172 Spring 2005

Out: March 2, 2005

Due: March 9, 2005 by 5 PM to CS172 Drop Box

1. (*Sipser 5.9*) Show that all Turing-recognizable problems mapping reduce to A_{TM} .
2. (*Sipser 5.11*) Give an example of an undecidable language B where $B \leq_m \overline{B}$. (i.e. present B , prove B is undecidable, prove $B \leq_m \overline{B}$.)
3. (*Sipser 5.12*) Let $S = \{\langle M \rangle \mid M \text{ is a TM that accepts } w^{\mathcal{R}} \text{ whenever it accepts } w\}$. Show that S is undecidable.
4. (*Sipser 5.15*) Consider the problem of testing whether a Turing machine M on an input w ever attempts to move its head to the left at any point during its computation on w . Formulate this problem as a language and show that it *is* decidable.