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 $S = \{\langle M \rangle \mid M$ is a TM that accepts $w^R$ 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.