

CSE 3321 - Problem Set 7

Due beginning of lecture on November 19th

Problem numbers are from the third edition of Sipser's book. If unsure about which problem to solve, ask. Collaboration is permitted; looking for solutions from external sources (books, the web, material from previous years, etc.) is prohibited.

1. Consider the problem of determining whether a Turing machine M on an input w ever attempts to move its head left at any point during its computation on w . Formulate this problem as a language and show that it is decidable.
2. Consider the problem of determining whether a Turing machine M on an input w ever attempts to move its head left when its head is on the left-most tape cell. Formulate this problem as a language and show that it is undecidable.
3. Let $T = \{\langle M \rangle : M \text{ is a T.M. that accepts } w \text{ reversed whenever it accepts } w.\}$. Determine whether T is decidable, undecidable but recognizable or unrecognizable. Prove your answer.
4. Show that A is Turing-recognizable iff $A \leq_m A_{TM}$.