CSCI 2400 – Models of Computation

Homework 6

Due: Thursday April 28, 5pm

Problem 1. Prove that a language L is decidable *if and only if* there is an enumerator that prints the strings of L in proper (canonical) order.

Problem 2. Formulate the following problem as a language and then prove that it is *decidable*:

> Given a Turing Machine M and an input string w determine whether M moves its head to the left during the computation on input string w.

Problem 3. Formulate the following problems as a language and then prove that it is *undecidable*:

> Given a Turing machine M a string w and a symbol x, determine whether M writes symbol x on the tape during the computation on input string w.

Hint: use a similar reduction as in the state-entry problem which we described in class.

Problem 4. Formulate the following problem as a language and then prove that it is *undecidable*:

> Given a Turing machine M determine whether $L(M) = \{Have, A, Great, Summer\}$.

Hint: use a similar reduction as in the Empty, Regular, and Size-2 language problems which we described in class.