

CSC544 Assignment #3

due Tuesday 2/17 in class

version 1.1

Problems

1. A Turing machine with a doubly infinite tape is similar to an ordinary Turing machines, but its tape is infinite to the left as well as to the right. The tape is initially filled with blanks except for the portion that contains the input. Computation is defined as usual except that the head never encounters an end to the tape as it moves leftward. Show that this type of Turing machine recognizes exactly the class of Turing-recognizable languages.
2. Show that the collection of decidable languages is closed under complementation.
3. Explain why the following is not a description of a legitimate Turing machine.

$M =$ "The input is a polynomial p over variables x_1, \dots, x_k .

1. Try all possible settings of x_1, \dots, x_k to integer values.
2. Evaluate p on all of these settings.
3. If any of these settings evaluates to 0, *accept*; otherwise, *reject*."