

CS46, Swarthmore College, Spring 2014

Homework 6 – due 27 March

Your Name(s) Here

1. Draw a TM state diagram for a single tape TM that when given input $w \in \{0, 1\}^*$ shifts w one tape square to the right, resulting in $\sqcup w$ on the input tape.
2. Sipser 3.8b: Give an implementation-level description of a TM that decides the language $L = \{w \mid w \text{ contains twice as many 0s as 1s}\}$. The book gives a solution for 3.8a that gives an idea of an appropriate implementation-level description of a TM.
3. Sipser 3.18: Show that a language is decidable iff some enumerator enumerates the language in short lexicographical order.
4. Sipser 3.19: Show that every infinite Turing-recognizable language has an infinite decidable subset. Hint: consider the previous question.
5. Sipser 4.3: Let $ALL_{DFA} = \{\langle A \rangle \mid A \text{ is a DFA and } L(A) = \Sigma^*\}$. Show ALL_{DFA} is decidable.