

CMPE 350 - Spring 2017

PS 10 - 02.05.17

4.10 $\text{INFINITE}_{\text{DFA}} = \{\langle A \rangle \mid A \text{ is a DFA and } L(A) \text{ is an infinite language}\}$. Show that $\text{INFINITE}_{\text{DFA}}$ is decidable.

4.21 Let $S = \{\langle M \rangle \mid M \text{ is a DFA that accepts } w^R \text{ whenever it accepts } w\}$. Show that S is decidable.

4.24 A useless state in a pushdown automaton is never entered on any input string. Consider the problem of determining whether a pushdown automaton has any useless states. Formulate this problem as a language and show that it is decidable.

- Prove that there exists a Turing machine M whose language L is decidable, but M is not a decider. This shows that just because a Turing machine's language is decidable, it's not necessarily the case that the Turing machine itself must be a decider.
- Let L be the language of all Turing machine descriptions $\langle M \rangle$ such that there exists some input on which M makes at least 5 moves. Show that L is decidable.
- Disprove: Every countable language is decidable.