CMPE 350 - Spring 2016

PS 20 - 04.05.16

3.18 Show that a language is decidable iff some enumerator enumerates the language in lexicographic order.

3.19 Show that every infinite Turing-recognizable language has an infinite decidable subset.

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

4.21 Let $S = \{< M > | M$ is a DFA that accepts w^R 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.