

CS580 Homework 11  
Fall 2024  
November 6, 2024  
(Due 4:10pm, November 13, 2024)

Email homework assignments to ldojcsak@vols.utk.edu by the beginning of class time.

Decide whether each of the following languages is decidable (recursive). If the language is decidable, informally describe an algorithm to decide it. If the language is undecidable, prove it is undecidable using Rice's Theorem.

1.  $L = \{ \langle M \rangle \mid M \text{ has more than 10 states} \}$
2.  $L = \{ \langle M \rangle \mid L(M) \text{ is context free} \}$
3.  $L = \{ \langle M, \omega \rangle \mid M \text{ enters its 10th state on input } \omega \}$
4.  $L = \{ \langle M, \omega \rangle \mid M \text{ moves right twice in a row on input } \omega \}$
5.  $L = \{ \langle M, \omega \rangle \mid M \text{ moves right three times in a row on input } \omega \}$
6.  $L = \{ \langle M \rangle \mid L(M) \text{ has an equivalent DFA} \}$
7.  $L = \{ \langle M \rangle \mid L(M) \text{ contains an unreachable state (a state never visited on any input)} \}$
8.  $L = \{ \langle M \rangle \mid L(M) \text{ is not recursively enumerable} \}$
9.  $L = \{ \langle M, \omega \rangle \mid M \text{ moves past its 10th tape cell on } \omega \}$