

CS21004 - Tutorial 12

April 15th, 2019

1. Are the following problem decidable/undecidable?
 - (a) $\{\langle B \rangle \mid B \text{ is a DFA that accepts a palindrome}\}$
 - (b) $LM_{TM} = \{\langle M, x \rangle \mid M \text{ ever moves left while computing on the input } x\}$
2. Identify which of the following languages are decidable / undecidable.
 - (a) $L_1 = \{M \mid M \text{ is a Turing machine that halts on exactly 481 strings}\}$
 - (b) $L_2 = \{M \mid M \text{ is a Turing machine and } |L(M)| \text{ is prime}\}$
 - (c) $L_3 = \{\langle M_1, M_2 \rangle \mid M_1 \text{ and } M_2 \text{ are two TMs, and } \epsilon \in L(M_1) \cup L(M_2)\}$
 - (d) $L_4 = \{\langle k, x, M_1, M_2, \dots, M_k \rangle \mid k \text{ is a natural number, } x \text{ is a string, } M_i \text{ is a TM for all } 1 \leq i \leq k, \text{ and at least } k/2 \text{ TM's of } M_1, M_2, \dots, M_k \text{ halt on } x\}$