

Theory of Computation, CSCI 438 spring 2022
Undecidability, 201-202, April 8

1. Prove that $A_{TM} = \{\langle M, w \rangle \mid M \text{ is a TM, } w \text{ is a string in the alphabet of the TM and } w \in \mathcal{L}(M)\}$ is not decidable? (I.e. is the acceptance problem for TM decidable?)

2. Prove that A_{TM} is Turing-recognizable.

$A_{TM} = \{ \langle M, w \rangle \mid M \text{ is a TM, } w \text{ is a string in the alphabet of } M, \text{ and } M \text{ accepts } w \}$

Exercise 4.10

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

Problem 4.21 (page 212)

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.