Theory of Computation '23
Problem Set 4

Problem 1. Say that a **write-once Turing machine** is a single-tape TM that can alter each tape square at most once (including the input portion of the tape). Show that this variant of the Turing machine is equivalent to the ordinary Turing machine model. (Hint: As a first step, consider the case where the TM can alter any tape square at most twice.)

Solution.

Problem 2. Show that Turing-recognizable languages are closed under

a. union

b. concatenation

c. star

Problem 3. Show that Turing-decidable languages are closed under

a. complementation

b. intersection

Problem 4. Show that a language is decidable if and only if there is an enumerator that enumerates the strings in the language in lexicographic order.