COMP3721 Tutorial 9

1 Recursive and Recursively Enumerable Languages

Q1. We know that the class of recursively enumerable languages is not closed under complementation. Show that it is closed under union and intersection.

2 Undecidability

Q1. Prove that the following problems are undecidable.

(a) Given a Turing machine M, a state q, and a string w, does M ever reach state q when started with input w from its initial state?

(b) To determine, given a Turing machine M and a symbol σ, does M ever write the symbol σ when started on the empty tape?

(c) Given a Turing machine M and an input string w, does M use a finite amount of tape squares on input w?