

Homework 14

December 9, 2019

Deadline

Due: December 16, 2019, 23:59. Good luck!

Problem 1

Let L_1, L_2, \dots, L_k be a collection of languages over alphabet Σ such that:

1. For all $i \neq j$, $L_i \cap L_j = \emptyset$; i.e., no string is in two of languages.
2. $L_1 \cup L_2 \cup \dots \cup L_k = \Sigma^*$; i.e., every string is in one of the languages.
3. Each of the languages L_i , for $i = 1, 2, \dots, k$ is recursively enumerable

Prove that each of the languages is recursive.

Problem 2

Let L_1, L_2 be two recursive languages, give an informal, but clear, construction to show that the concatenation of two languages $L_3 = \{w_1w_2 | w_1 \in L_1 \wedge w_2 \in L_2\}$ is also recursive.

Problem 3

Encoding the TM to binary string (You may need to reassign the states):

	0	1	B
$\rightarrow q_0$	$(q_0, 1, R)$	$(q_0, 0, R)$	(q_1, B, L)
q_1	$(q_2, 0, L)$	-	-
$*q_2$	-	-	-