Universität Siegen
Lehrstuhl Theoretische Informatik
Markus Lohrey

Exercise 2

Task 1. Show that the following languages are in **L** by constructing Turing machines for these languages.

1. $L_1 = \{a^n b^n c^n \mid n \geq 1\}$
2. $L_2 = \{v\$v \mid v \in \Sigma^*\}$

Task 2. Prove the statement on slide 22.

Task 3 (Nondeterministic Logspace)**.** A directed graph $G = (V, E)$ is called *strongly connected*, if for all pairwise distinct nodes v_i, v_j there is a directed path from v_i to v_j.
Does the problem
Input: A directed graph $G = (V, E)$.
Question: Is G strongly connected?
belong to the complexity class **NL**?

Task 4 (Deterministic Logspace)**.** Does the problem
Input: An integer $N \in \mathbb{N}$ in *unary* encoding.
Question: Is N a prime number?
belong to the complexity class **L**?