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Homework for
Komplexitätstheorie
A. Y. 16/17
Assignment 1

Exercise 1.1

Given the alphabet $\Sigma = \{0, 1\}$, design the components of a 1-tape DTM which accepts the language $L = \{0^n 1^n \mid n \geq 0\}$ in $O(n \log n)$ steps. Moreover, show that a 2-tape DTM can accept L in only $O(n)$ steps (a high-level description suffices).

Exercise 1.2

Design the components of a 2-tape DTM that, on input 1^n , computes the binary representation of n .

Exercise 1.3

Show that a standard DTM M (as defined in Section 2.1 of the lecture notes) and a DTM M' equipped with a read-only input tape can be reciprocally simulated.

Exercise 1.4

Give a high-level description of an NTM M which accepts the language $L = \{1^n \mid n = pq \text{ for integers } p, q > 1\}$.