Marburg University

Department of Computer Science
Prof. Dr. Sebastian Wild

Date: 2025-01-23
Version: 2026-01-23 15:51

Exercise Sheet 12 for Algorithms of Bioinformatics (Winter 2025/26)

Hand In: *Until 2026-01-30 18:00, on ILIAS.*

Problem 1

10 + 10 points

a) For each of the following, $B_1 =$ `b$aaabbbccc`, $B_2 =$ `$a`, and $B_3 =$ `ba$`, is it possible to obtain to B_i as the Burrows-Wheeler transform of any string?

b) How many strings $s_1, \ldots, s_{n+1}$ containing \$ and each integer from 1 to n exactly once are the Burrows-Wheeler transform of a string?

Problem 2

30 points

Give a *simple, practically efficient* algorithm for Range Minimum Queries, using $O((n+m)\alpha(n))$, where α is the *inverse Ackermann function*, n is the length of the array, and m is the number of RMQ queries.

Hint: Use a disjoint-set data structure.