

Algorithms in Comparative Genomics

Bielefeld University, WS 2019/20

Dr. Roland Wittler

<https://gi.cebitec.uni-bielefeld.de/teaching/2019winter/cg>

Exercise sheet 11, 09.01.2020

Exercise 1 (Range Minimum Queries)

Have a look at the following paper to answer the questions below:

Bender, M. A., and Farach-Colton, M. *The LCA problem revisited*. Proceedings of CPM, 1776 (Chapter 9), 88–94, 2000.

1. What is the LCA problem?
2. What is the RMQ problem?
3. What is the ± 1 RMQ problem?
4. Which problem is reduced to which, and what are the known or induced time complexities for preprocessing and query each?
5. What is the relation to the *rank distance* in Didier's algorithm?

Exercise 2 (Number of maximal intervals)

Prove the following statement:

The number of maximal intervals grows in general as a quadratic function of the length of the sequence.