



Homework Sheet 8: Deterministic Network Decomposition

Due Date: 30 June 2019

The latest lecture was on a deterministic algorithm for network decomposition in the LOCAL model. For references see the lecture note of M. Ghaffari. Here you have provided a formal proof for corresponding lemmas in the above lecture note. Of course, per usual you can first read the proofs from the lecture note, however, you have to write your own understanding.

1. Provide an algorithm that computes $(k, k \log n)$ -ruling set in a logarithmic number of rounds. I.e. prove the correctness of lemma 1.38 in the above lecture notes.
2. Let $d > 1$ be an integer. Provide a deterministic algorithm with running time $d \cdot O(\log n)^{\log_d n}$ and computes a $(d \log_d n, O(\log n)^{\log_d n})$ network decomposition of the input graph. Now set d to appropriate value to get the round complexity $2^{O(\sqrt{\log n \log \log n})}$.