Models of Computation, an Algorithmic Perspective

Assignment 5

This assignment is due on November 24/26 in your respective tutorial groups. You are allowed (even encouraged) to discuss these problems with your fellow classmates. All submitted work, however, must be written individually without consulting someone else’s solutions or any other source like the web.

Exercise 1  Consider the decentralized algorithm (depicting the small world phenomena) from the lecture. We showed that for parameters $\ell = f = 1$ and $\alpha = 2$ (see lecture notes for the description of parameters), the expected delivery time of the algorithm is $O(\log^2 n)$. Show that the algorithm requires $O(\log^3 n)$ rounds with probability at least $1 - n^{-2}$ to deliver the message to the target.

Exercise 2  Show that the time complexity of the GHS algorithm is $O(n \log n)$. You may assume that the algorithm is correct and always terminates.