UV Distributed Algorithms

Exercise Sheet 3

https://avs.cs.sbg.ac.at/

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Exercise 3.1

Given a synchronous, uniform ring with n nodes where each node has a unique identifier denoted by $v_1, ..., v_n$, let $\mathcal{A}$ be any deterministic algorithm that finds a unique leader. Prove that $\mathcal{A}$ needs at least $\frac{n}{4}$ rounds and $\Omega(n)$ messages. For simplicity, you may assume that $\frac{n}{4}$ is an integer.

Exercise 3.2

In the lecture we have seen the Radius Growth algorithm for leader election by Hirschberg and Sinclair. In this algorithm, the radius grows by a factor 2 in each phase. Investigate what happens to the number of rounds and message complexity when the radius grows by a factor $k \geq 2$. Prove your bounds.