UV Distributed Algorithms

Exercise Sheet 1

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

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Exercise 2.1

Given a synchronous, anonymous, uniform network with n nodes for which the graph of the network is connected and does not contain cycles, prove that a leader can be elected in this network by using a randomized algorithm which runs in $O(n)$ rounds using $O(n)$ messages in expectation.

Hint: In case of multiple potential leader candidates, perform the tiebreaking as simple as possible.

Exercise 2.2

Consider the following zero-round (randomized) leader election algorithm. Each node declares itself the leader with probability p. The algorithm is successful if there is exactly one leader. For what choice of p is the algorithms success probability the highest? Prove your choice. What is the lower bound for the success probability of the algorithm in this case?