Principles of Distributed Computing
Exercise 2

1 Leader Election in an "almost anonymous" Ring

a) Is leader election possible in a synchronous ring in which all but one processors have the same identifier? Either give an algorithm or prove an impossibility result.

2 Distributed Computation of the AND

Consider an anonymous ring where processors start with binary inputs.

a) Prove that there is no uniform synchronous algorithm for computing the AND of the input bits.

b) Present an asynchronous (non-uniform) algorithm for computing the AND; the algorithm should send $O(n^2)$ messages in the worst case.

c) Present a synchronous algorithm for computing the AND; the algorithm should send $O(n)$ messages in the worst case. What is the time complexity of your algorithm?