Homework Exercise
Due: February 4, 2002

2. Consider an asynchronous ring of processes. Each process has a unique id, but does not initially know the ids of any other processes or even how many processes there are. There are no failures. The following two different versions of Leader Election were discussed in class.

LE: Every process must output 0 or 1. Exactly one process must output 1.

LE$'$: Every process must output the minimum id of any process in the system.

We showed (or shall show) in class that every algorithm for LE$'$ uses $\Omega(n \log n)$ messages in the worst case (where n is the number of processes in the ring). Explain why it follows from this that every algorithm for LE must use $\Omega(n \log n)$ messages in the worst case.

Hint: How can the solution to one version of the problem be used to solve the other version?