This assignment should be done individually. You cannot discuss the assignment with anyone or look for solution on the Internet. The assignment will be due in class on 11th Feb.

1. **(10 points)** Suppose that the underlying communication system guarantees FIFO ordering of messages. How will you exploit this feature to reduce the communication complexity of the vector clock algorithm? You should use only $O(n)$ storage at each process.

2. **(10 points)** Some applications require two types of accesses to the critical section—read access and write access. For these applications, it is reasonable for multiple read accesses to happen concurrently. However, a write access cannot happen concurrently with either a read access or a write access. Modify Lamport’s mutex algorithm for such applications.

3. **(10 points)** Extend Ricart and Agrawala’s mutex algorithm to solve $k$-mutual exclusion problem, in which at most $k$ processes can be in the critical section concurrently.