CSC 8980
Distributed Systems
Fall 2022

Homework #3 (Exam #2 Preparation)

1. Design a mutual exclusion algorithm for logical clocks and a centralized resource controller. Let P_0 be the centralized controller and $P_1 \ldots P_n$ the competing processes. Using *request(), inform(), ack(), grant, and release()* messages with corresponding timestamps, develop a protocol that allows P_0 to grant access to the centralized resource in proper order. Prove that your algorithm is correct and deadlock/starvation free.

2. In Lamport's paper "*Time, Clocks, and the Ordering of Events in Distributed Systems"* it was asserted that the inequality $\varepsilon / (1 - \kappa) \leq \mu$ together with PC1 And PC2 make anomalous behavior impossible. Formally derive this inequality.

3. Using Ricard and Agrawala's algorithm for controlling access to resources, develop a solution to the Readers-Writers Problem with writer preference (see paper section 6.6). What changes do you propose to achieve weak/strong reader priority while trying to retain the spirit of the R & A algorithm?