

**CSE760 – Au 2006**  
**Homework III**  
**Mutual Exclusion and Concurrency Control (20 pts.)**

- 1) A distributed system can have multiple, independent critical regions. Imagine that process 0 wants to enter a critical region *A* and process 1 wants to enter critical region *B*. Can Ricart and Agrawala's algorithm lead to deadlocks? Explain your answer. (Same as Problem 5.13) [5 points]
- 2) Show that in 2PL a serialization order of a set of transactions is the same as the order of their lock points in a log. (Hint: proof by contradiction. Suppose that in the serialization order of the execution, transaction  $T_1$  precedes  $T_2$ , but that the lock point of  $T_2$  occurred before the lock point of  $T_1$  in the execution ...) [10 points]
- 3) In Fig 5-12 of the textbook we have two *ELECTION* messages circulating simultaneously. While it does no harm to have two of them, it would be more elegant if one could be killed off. Devise an algorithm for doing so without affecting the operation of the basic election algorithm. (Same as Problem 5.7) [5 points]