Name:

CS 6/73201

Exam #2

Advanced OS

Wednesday 24 March 1999

1. Briefly describe the Nachos Post Office. (10 points)

- 2. Two alternatives to synchronization are semaphores, and locks and condition variables.
 - a. Is it possible to "lock" a critical section of code in two separate processes using a semaphore, and then use another semaphore inside that critical section to signal between the processes (i.e., one process does a semaphore wait and the other does a semaphore signal)? Explain. (7 points)

b. Is it possible to do this using locks and condition variables? Explain. (8 points)

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3. Briefly explain (i) the hardware behind a physical clock, and (ii) how it is used to determine time-of-day. (15 points)

4. With logical and vector clocks, if $a \rightarrow b$, then C(a) < C(b). Is it also true that if C(a) < C(b), then $a \rightarrow b$? Explain. (10 points)

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- 5. For each of the following mutual exclusion algorithms, clearly explain either (i) how it guarantees "happened before" ordering of the requests, or (ii) why it does not make this guarantee. Note that I am <u>not</u> asking for a summary of the algorithm, but instead an answer to this specific question! (28 points)
 - a. Lamport's algorithm

b. Suzuki and Kasimi's algorithm

c. Le Lann's token ring algorithm

d. Raymond's tree algorithm

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6. For <u>each of the three types</u> of messages sent by Garcia-Molina's bully algorithm, does the algorithm work correctly if an individual message gets lost? Explain your answer. (15 points)

7. What is the big (i) advantage and (ii) disadvantage of self-stabilizing algorithms? (7 points)