22C:166: Distributed Systems and Algorithms
Fall 2004
Homework 6
Assigned December 2, 2004 due December 9, 2004
Total points = 50 points
There are four questions. Email your solutions to the TA (spandit@cs.uiowa.edu) by 11:59:59 PM of December 9, 2004. Use .doc or .pdf or ascii only to submit your answer.

Question 1. (10 points) Present an example where a group of three processes 0,1,2 communicate using causal order multicast, and a message from process 0 has a vector timestamp (2, 1, 0) reaches node 2 whose local vector clock is (1, 3, 2) and the message is accepted by process 2. Your example must show the entire history of communications.

Question 2. (20 points) Consider a strongly connected network of N processes. Interprocess communication uses shared memory. Each process maintains a replica of every shared variable in the network.

What protocols will a process use to perform read and write operations on a shared variable, so that sequential consistency is maintained. Justify why your protocol will satisfy sequential consistency.

Question 3. (20 points) Bob is the president of the Milky Way club of sky-watchers, and also the president of the Himalayan Hikers club of nature lovers. From time to time, Bob will send out messages to the members of these groups, and these messages will be delivered in the FIFO order among the group members.

Now assume that some members of the Milky Way club also joined the Himalayan Hikers club, as a result, the two groups overlapped. Argue why the FIFO-ordered multicast algorithm may not work for the members who belong to both clubs. Also suggest modifications that will preserve the FIFO order of message delivery among members of both clubs, including those in the intersection of the two memberships.