Massachusetts Institute of Technology | Handout 22
6.852: Distributed Algorithms
Prof. Nancy Lynch | November 20, 2003

Problem Set 6, Part b

Due: Tuesday, December 2, 2003

Reading:

Maurice Herlihy and Nir Shavit. *Introduction to Multiprocessor Synchronization and Concurrent Data Structures.* Chapter 6. (In the course cabinet.)

Distributed Algorithms, Chapter 17.
Leslie Lamport. *Paxos Made Simple.* In the course website.

Reading for next week:

Chapter 22

Problems:

1. Consider the modification to the universal construction presented in Figure 6.4 of the notes by Herlihy and Shavit where you switch the following two lines:

```
...
   while (this.announce[i].seq == 0) {
      this.head[i] = Cell.max(this.head);
...
```

   Is the modified version still a wait-free universal construction? Either prove your answer or give a counter-example.

2. Exercise 17.9

3. Exercise 17.10

4. A *read/write quorum system* is a set of *read quorums* and a set of *write quorums* that have certain properties (see below). A process doing a read waits until it has responses from all processes in some read quorum; one doing a write waits for responses from all processes in some write quorum.

   Generalize Paxos to use quorums instead of simple majorities. State the weakest property that the read/write quorum system is required to have to preserve the correctness of Paxos, and argue that your generalization preserves the invariants stated in the paper.