

## Problem Set 3, Part a

**Due:** Thursday, October 20, 2005

### Reading:

Chapter 8. Chapter 14 (skim). Chapter 15.

**Reading for next week:** Chapters 16 and 18.

### Problems:

1. Exercise 8.8.
2. The standard FIFO reliable channel automaton  $C_{i,j}$ , defined on p. 204, can itself be regarded as an “optimized version” of another automaton  $C'_{i,j}$ , which keeps track in its state of the entire history of messages that have been sent.  $C'$  also maintains a pointer that indicates the last message that has been delivered.
  - (a) Write I/O automaton pseudocode for  $C'_{i,j}$ . (You should check your code using the TIOA front-end.)
  - (b) Prove that  $C_{i,j}$  implements  $C'_{i,j}$ , in the sense that  $traces(C_{i,j}) \subseteq traces(C'_{i,j})$ , using a simulation relation.
  - (c) Is it also true that  $C'_{i,j}$  implements  $C_{i,j}$ , in the same sense? If so, give a simulation relation to demonstrate this implementation relationship; you do not need to prove that it is in fact a simulation relation. If not, then show a counterexample.
3. Exercise 15.7. (You should check your code using the TIOA front-end.)
4. Exercise 15.12.
5. Exercise 15.27.