Homework Exercise #1
Due: September 29, 2008

1. In this question, you will consider two models of distributed systems. Both models have asynchronous processes that are reliable (*i.e.*, there are no process failures). Each process has a unique identifier.

In both models, processes communicate by sending messages to one another and every process is connected to every other process by a channel. The channels are also asynchronous, so the time for a message to cross a channel from sender to receiver is unpredictable. Each process knows the ids of the processes at the other end of each of its channels, so it can send a message to a particular process, and it knows the identifier of the sender of each message it receives.

In **Model A**, the message channels can carry only 8-bit messages, and messages may get reordered in the channels. (That is, if several messages are en route from process 1 to process 2, they may arrive at process 2 in a different order from the order that process 1 put them into the channel.) Each message sent across a channel is guaranteed to be delivered eventually.

In **Model B**, the message channels can drop some messages. However, if process 1 sends the *same* message to process 2 infinitely many times, at least one copy of it will eventually be delivered to process 2. Aside from the dropped messages, each channel is FIFO (first-in, first-out): messages that are delivered are delivered in the order that they were sent. There is no limit on the length of messages that can be sent in Model B.

(a) Is Model A at least as strong as Model B? Show your answer is correct.

(b) Is Model B at least as strong as Model A? Show your answer is correct.