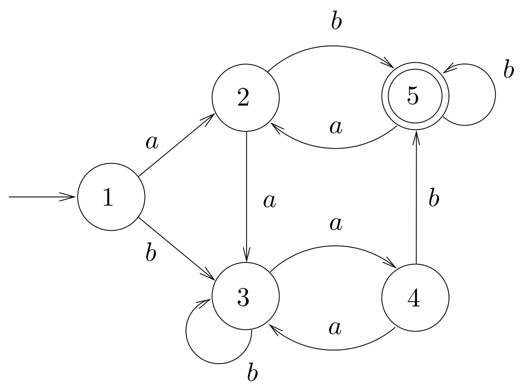
T–79.1001/2 **Autumn 2007**
Introduction to Theoretical Computer Science T/Y
Tutorial 3, 27 September to 2 October
Problems

Homework problems:

1. Construct a nondeterministic finite automaton that tests whether a given binary input sequence contains 101 or 011 (or both) as a subsequence. Make the automaton deterministic using the subset construction.

2. Construct the minimal automaton corresponding to the following deterministic finite automaton:



3. Show that if a language $L \subseteq \{a, b, c\}^*$ is recognised by some finite automaton, then so is the language $L|\{a, b\}$, which is obtained by removing all c's from each string in L.

Demonstration problems:

4. Construct a nondeterministic finite automaton that tests whether in a given binary input sequence the third-to-last bit is a 1. Make the automaton deterministic using the subset construction.

5. Show that if a language $L \subseteq \{a, b\}^*$ is recognised by some finite automaton, then so is the language $L^R = \{w^R \mid w \in L\}$. (The notation w^R means the reverse of string w, that is, the string where the characters of w are in reverse order.)

6. Show that if languages A and B over the alphabet $\Sigma = \{a, b\}$ are recognised by some finite automata, then so are the languages $\bar{A} = \Sigma^* - A$, $A \cup B$, and $A \cap B$.