Homework problems:

1. Construct a nondeterministic finite automaton that tests whether a given binary input sequence contains either 101 or 110 (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:

![Automaton Diagram]

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 $w$, cf. problem 1/3.)

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 $A \cap B$. 