Introduction to computability
Tutorial 2

Finite Automata

25 September 2014
1. For both of the following automata:

   a) give a regular expression of the language accepted by this automaton (without using the \( R(i, j, k) \) - method);

   b) give an equivalent deterministic finite automaton.
2. Give a deterministic finite automaton that accepts
   a) the language with regular expression \((ab \cup ba)^+\); 
   b) the language with regular expression \(ab \cup (aab)^*\); 
   c) the language containing the words defined on \(\{a, b\}\) where the number of \(a\)'s is a multiple of 4.

3. Show, using the theory on finite automata that the regular expressions \((a^*b)^*\) and \(\varepsilon \cup (a \cup b)^*b\) denote the same language.
Give a regular expression of the language accepted by this automaton. If the accepted words are considered as being binary representations of integers, determine the arithmetic properties of the accepted words.