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581330-2 Models for Programming and Computing

Exercise 2 (31.1.-4.2.2005)

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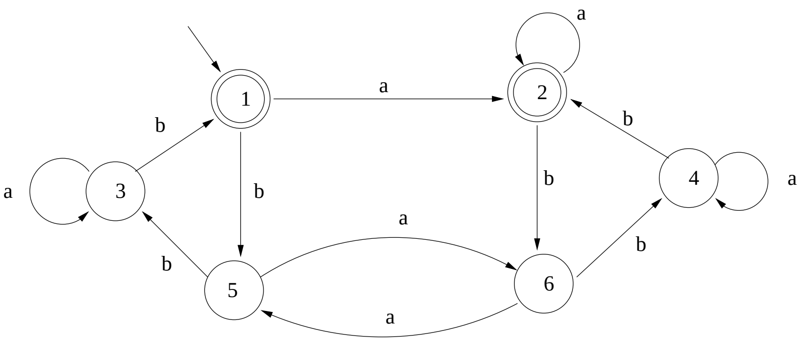
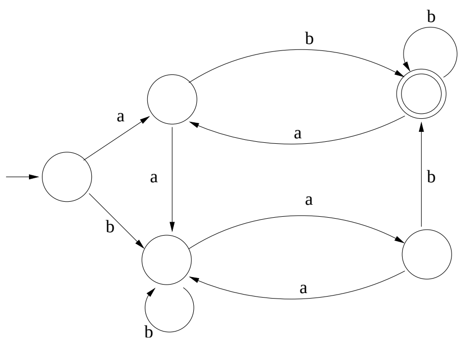
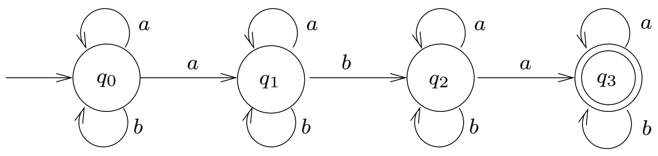
1. Construct a deterministic finite automaton that recognizes variable names that satisfy the following:
   - A variable name consists of letters, numbers, and underscores only.
   - The first letter of a variable name is not a number.
2. Construct finite automata that recognize the following languages:
   (a) $\{w \in \{a,b\}^* \mid w$ contains exactly two *a*:s and at least one *b* $\}$
   (b) $\{w \in \{a,b\}^* \mid w$ contains odd number of *a*:s $\}$
   (c) $\{w \in \{a,b\}^* \mid w$ contains an even number of *a*:s and the number of *b*:s is dividable by 3 $\}$
3. Construct finite automata that recognize the following languages:
   (a) $\{w \in \{a,b\}^* \mid w$ contains subsequence *aa* or *bb* $\}$
   (b) $\{w \in \{a,b\}^* \mid w$ does not contain subsequences *aa* or *bb* $\}$
   (c) $\{w \in \{a,b\}^* \mid w$ contains both the subsequences *ab* ja *ba* (which may overlap) $\}$
4. Minimize the following deterministic finite automaton:



5. Minimize the following deterministic finite automaton:



6. Determinize the following non-deterministic automaton:



   What is the language recognized by the automaton?