Exercise 2 (31.1.-4.2.2005)

- 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) $\{w \in \{a, b\}^* \mid w \text{ contains exactly two } a \text{:s and at least one } b \}$
 - (b) $\{w \in \{a, b\}^* \mid w \text{ contains odd number of } a:s \}$
 - (c) $\{w \in \{a, b\}^* \mid w \text{ contains an even number of } a:s \text{ and the number of } b:s \text{ is dividable by 3} \}$
- 3. Construct finite automata that recognize the following languages:
 - (a) $\{w \in \{a, b\}^* \mid w \text{ contains subsequence } aa \text{ or } bb \}$
 - (b) $\{w \in \{a, b\}^* \mid w \text{ does not contain subsequences } aa \text{ or } bb \}$
 - (c) $\{w \in \{a, b\}^* \mid w \text{ contains both the subsequences } ab \text{ ja } ba \text{ (which may overlap) } \}$
- 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?