

Foundations of Computer Science I

ASSIGNMENT 2

Due: Monday, Oct. 19, 2009

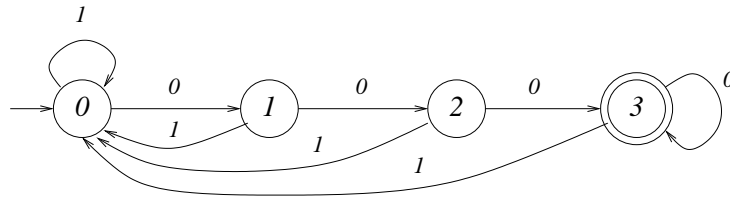
- Given the language $L = \{a^i b^i \mid i \geq 1\}$, write a (more intuitive) definition for each of the following languages:

(a) $L_1 = L^R$, (b) $L_2 = L^2$, (c) $L_3 = L^*$.

- For each of the following languages over the alphabet $\Sigma = \{a, b\}$, give a deterministic finite automaton (DFA) that accepts the language. Note that all the DFAs are required to be complete. (Transition diagrams only)

- The set of all words that have aab as a subword.
- The set of all words that have aab as a scattered subword.
- The set of all words such that the third symbol from the right-end is a .

- Given the following state transition diagram of a DFA, describe the set of integers represented by the binary numbers that are accepted by the DFA.



- Prove that the language $L = \{a^i b^j a^k \mid i, j, k \geq 0 \text{ and } j < k\}$ is not accepted by any DFA.

- Design nondeterministic finite automata (NFA) for the following languages over the alphabet $\{a, b, c\}$. (Transition diagrams only.)

- The set of all words that have a subword $aababcc$.
- The set of all words such that the sixth symbol from the right-end is c .

- Convert the following NFA into a DFA ($\Sigma = \{a, b, c\}$). Intermediate steps are required.

