

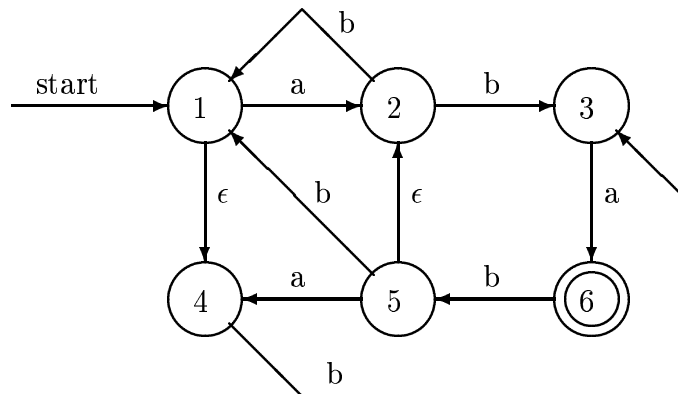
Midterm Exam

Each of the three questions is worth five points, for a total of 15 points. Write your name and id number at the top of the first page you submit. Write the solutions for different questions on different sheets of paper. Don't submit this handout.

- Convert this regular expression to a nondeterministic finite automaton.

$$(b|(ca))^*((a|(c^*))b)^*$$

- Convert this NFA to a DFA. Show each DFA-edge and each closure from that edge. Show also the state transition table.



- Consider the grammar

$$\begin{aligned}
 S &::= S S \mid i = E ; \mid i [E] = E ; \\
 E &::= E . i \mid i
 \end{aligned}$$

where $\{S, E\}$ is the set of non-terminal symbols, S is the start symbol, and

$$\{ ; = . [] \} \cup \{ i \mid i \text{ is an identifier} \}$$

is the set of terminal symbols. (Identifiers are not defined here.) Give an LL(1) grammar which generates the same language as the one above, show the FIRST and FOLLOW sets for each nonterminal symbol, and the predictive parsing table. Argue that the grammar is LL(1).