Exam 1 — CSU 390 Theory of Computation — Fall 2007

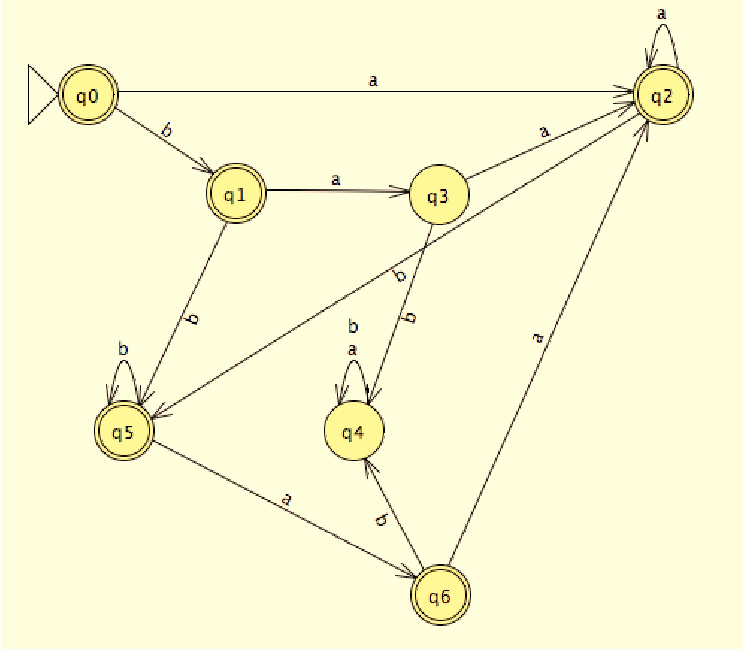
Solutions

Problem 1 [10 points]

Construct a state transition diagram for a DFA that recognizes the following language over the alphabet $\Sigma = \{a, b\}$:

$L_1 = \{w | w \neq ba$, and w does not contain $bab\}$

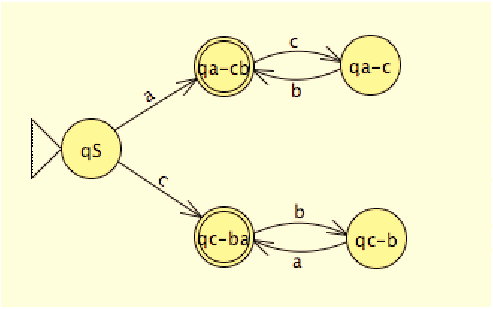
Solution:



Problem 2 [10 points]

Construct a state transition diagram for 5-state NFA that recognizes the language given by the regular expression $a(cb)^* \cup c(ba)^*$.

Solution:



Problem 3 [10 points]

Give a regular expression for the language L_2 over the alphabet $\Sigma = \{0, 1\}$:

$L_2 = \{w | w$ starts with 1, ends with 0, contains an even number of *substrings* $01\}$

Solution:
$1(0 + 1 + 0 + 1+) * 0$

Note: I omitted the word *substrings* on the exam — it was shown on the blackboard. However, a large number of people misread the problem. Therefore, the solution:

$1(0101) + 0$

was considered *nearly correct* for 9 out of 10 points.