Automata Theory - Quiz I (Solutions)

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1 Problems

1. Design a DFA to accept the language L, where
   $L = \{w |\ w \in \{0,1\}^*,\ \ w\ is\ divisible\ by\ 3,\ when\ interpreted\ as\ a\ binary\ number\}$. (3 points)
   Solution: □

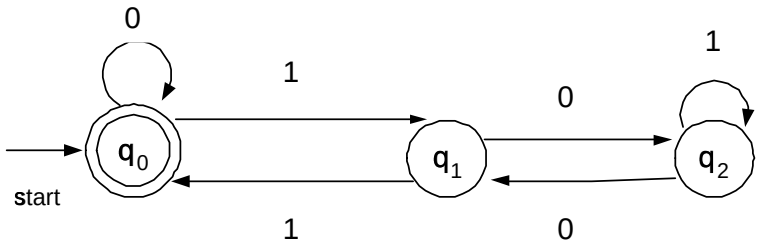

Figure 1: DFA

2. Convert the NFA in Figure (2) to a DFA. (3 points)

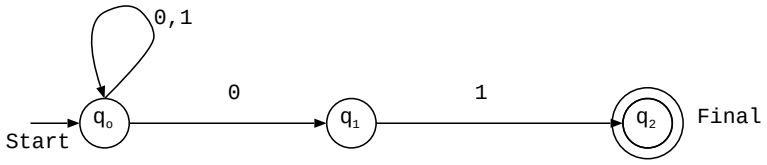

Figure 2: NFA

Solution: □

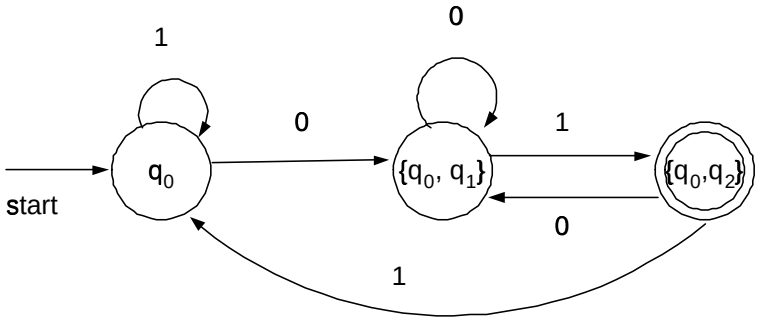

Figure 3: DFA

3. Convert the regular expression $\mathbf{01}^* + (\mathbf{0} + \mathbf{1})^*$ into an ϵ-NFA. (3 points)

Solution: □

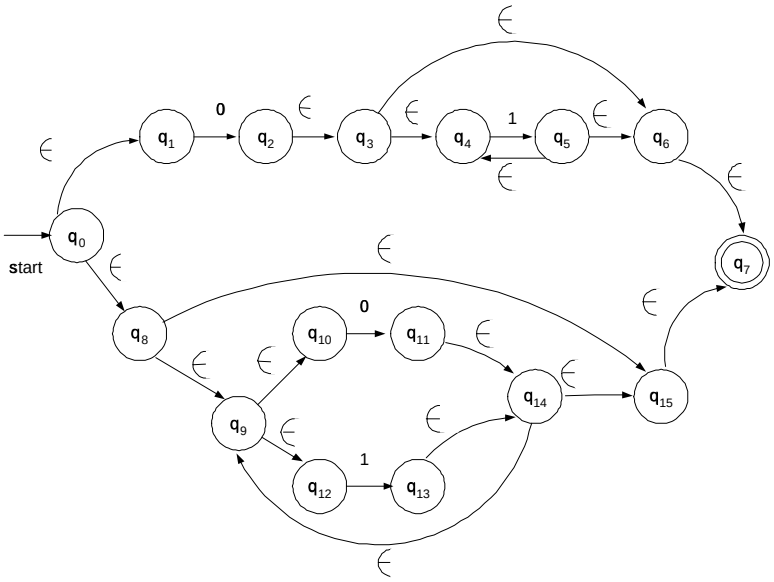

Figure 4: ϵ-NFA

4. Let $\Sigma = \{0, 1, 2\}$ be an alphabet. Write a regular expression to accept all strings over Σ^*, such that the third symbol from the right is 1 or 2, but not 0. (1 point)

Solution:

$$(0 + 1 + 2)^*(1 + 2)(0 + 1 + 2)(0 + 1 + 2)$$

□