
QUIZ 1

CS 373: THEORY OF COMPUTATION

Date: September 9, 2010. Lecture Section AL1. Time limit: 15 minutes.

Name	
netid	
Discussion	Tu 2-2:50 Tu 3-3:50 Tu 4-4:50 W 4-4:50 W 5-5:50

Pick the correct alternative from among the choices (A), (B), and (C) provided for each question below. Each question is worth **1 point**.

1. Consider the set X defined inductively as follows: (1) $(3, 5) \in X$, (2) if $(x, y) \in X$ then $(x + 2, y) \in X$, and (3) if $(x, y) \in X$ then $(y, x) \in X$. Which of the following pairs is a member of X ?
(A) $(222, 402)$
(B) $(1, 7)$
(C) $(151, 1171)$
2. Let $L = \{010, 101, 001, 011\}$, and $K = \{w \mid 0w \in L\}$. Which of the following strings is a member of K ?
(A) 0101
(B) 01
(C) 011
3. Let M be a DFA such that M accepts the empty string ϵ .
(A) The initial state of M must be an accepting state.
(B) There is a DFA N that recognizes the same language as M and has exactly one final state.
(C) The initial state of M is not an accepting state.
4. Let $M = (Q, \Sigma, \delta, q_0, F)$ be a NFA. Recall that we had defined a function $\hat{\Delta} : Q \times \Sigma^* \rightarrow 2^Q$ that given a state q and string w returns the states of all the active threads after reading w from q . Using $\hat{\Delta}$ we can define acceptance as w is accepted by M iff
(A) $\hat{\Delta}(q_0, w) \in F$
(B) $\hat{\Delta}(q_0, w) = F$
(C) $\hat{\Delta}(q_0, w) \cap F \neq \emptyset$

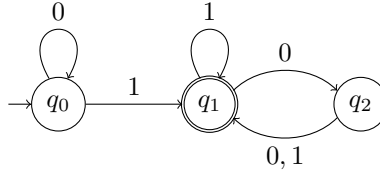


Figure 1: DFA M for question 5

5. Recall that 0 is an even number. The language recognized by DFA M in Figure ?? is

- (A) $\{w \mid w \text{ has even length}\}$
- (B) $\{w \mid w \text{ has at least one 1 and has an even number of 0s after the last 1}\}$
- (C) $\{w \mid w \text{ has at least one 1 and has an even number of 0s}\}$

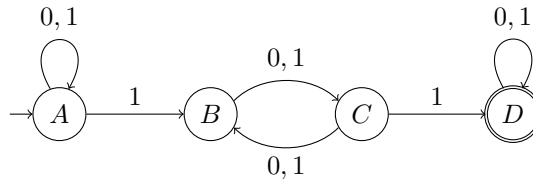


Figure 2: NFA N for question 6

6. The language recognized by NFA N in Figure ?? is

- (A) $\{w \mid w \text{ is a string of 0s and 1s}\}$
- (B) $\{w \mid w \text{ is a binary number that is a multiple of 4}\}$
- (C) $\{w \mid w \text{ has a pair of 1s separated by an odd number of symbols}\}$