Quiz 1
CS 373: Theory of Computation

Date: September 23, 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. Let $N = (Q, \{0,1\}, \delta, q_0, F)$ be an NFA such that $L(N) = \{0,1\}^*$. Then,
   (A) Every state must be a final state, i.e., $F = Q$.
   (B) No state is a final state, i.e. $F = \emptyset$.
   (C) Neither of the above

2. Consider $r = (ab^*a \cup b^*)^*$. Which of the following is true about $L(r)$?
   (A) $a \in L(r)$
   (B) $aa \in L(r)$
   (C) There is at least one b in every string belonging to $L(r)$

3. For $n \geq 0$, let $L_n = \{a^i b^k \mid i \geq n,\ 0 < k < i\}$.
   (A) L_n is regular, independent of the value of n
   (B) L_n is not regular, independent of the value of n
   (C) L_n is regular only for small values of n

4. Let L_1 be an infinite regular language. Let L_2 be an infinite set such that $L_2 \subseteq L_1$.
   (A) L_2 is definitely regular because L_1 is regular
   (B) L_2 is never regular because L_2 is infinite
   (C) L_2 may or may not be regular

5. Consider $L_1, L_2 \subseteq \Sigma^*$ such that L_1 and $L_1 \cup L_2$ are regular.

   (A) L_2 is definitely regular

   (B) L_2 may not be regular

   (C) $L_2 = (L_1 \cup L_2) \setminus L_1$

6. Consider $L \subseteq \Sigma^*$ such that $\Sigma^* \setminus L$ is not regular. Then,

   (A) L is definitely regular

   (B) L may or may not be regular

   (C) L is definitely not regular