
QUIZ 3

CS 373: THEORY OF COMPUTATION

Date: October 19, 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 following Turing Machine: $M = (\{q_0, q_1, q_2, q_{acc}, q_{rej}\}, \{0, 1\}, \{0, 1, \sqcup\}, \delta, q_0, q_{acc}, q_{rej})$, where

$$\begin{array}{ll} \delta(q_0, 0) = (q_1, 1, R) & \delta(q_1, 1) = (q_2, 0, L) \\ \delta(q_2, 1) = (q_0, 1, R) & \delta(q_1, \sqcup) = (q_{acc}, \sqcup, R) \end{array}$$

As always, we assume for cases not mentioned above, $\delta(q, a) = (q_{rej}, \sqcup, R)$. Suppose the current configuration is $1q_11$. The next configuration is

- (A) q_201
- (B) $1q_20$
- (C) q_210

2. Consider the following Turing Machine: $M = (\{q_0, q_1, q_2, q_{acc}, q_{rej}\}, \{0, 1\}, \{0, 1, \sqcup\}, \delta, q_0, q_{acc}, q_{rej})$, where

$$\begin{array}{ll} \delta(q_0, 0) = (q_1, 1, R) & \delta(q_1, 1) = (q_2, 0, L) \\ \delta(q_2, 1) = (q_0, 1, R) & \delta(q_1, \sqcup) = (q_{acc}, \sqcup, R) \end{array}$$

As always, we assume for cases not mentioned above, $\delta(q, a) = (q_{rej}, \sqcup, R)$. What can we say about the Turing machine M ?

- (A) M halts on all inputs
- (B) M never halts on some inputs
- (C) M does not halt on any input

3. Which of the following is true for the input alphabet Σ and the tape alphabet Γ of a Turing machine?

- (A) It is possible for Σ and Γ to be equal.
- (B) Γ is always a strict superset of Σ .
- (C) It is possible for Σ and Γ to be disjoint.

4. Suppose M_1 and M_2 are two TMs such that $L(M_1) = L(M_2)$. Then
- (A) on every input on which M_1 does not halt, M_2 does not halt.
 - (B) on every input on which M_1 halts, M_2 halts too.
 - (C) on every input which M_1 accepts, M_2 halts.
5. If L_1 and L_2 are decidable then $L_1 \cup L_2$ is
- (A) Decidable
 - (B) Turing-recognizable but may not be decidable
 - (C) May not be Turing-recognizable
6. If L is Turing-recognizable, then
- (A) L and \overline{L} must be decidable.
 - (B) L must be decidable, but \overline{L} need not be.
 - (C) either L is decidable, or \overline{L} is not Turing-recognizable.