
QUIZ 5

CS 373: THEORY OF COMPUTATION

Date: November 16, 2010. Lecture Section AL2. 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**.

$$\begin{aligned} S &\rightarrow AX \mid YC \\ A &\rightarrow aA \mid \epsilon \\ C &\rightarrow cC \mid \epsilon \\ X &\rightarrow bXc \mid \epsilon \\ Y &\rightarrow aYb \mid \epsilon \end{aligned}$$

Figure 1: Context Free Grammar $G_* = (V = \{S, A, C, X, Y\}, \Sigma = \{a, b, c\}, R, S)$ for problems 1, 2, and 3. The rules for G_* are given above.

1. In grammar G_* , which of the following strings can be derived from S in zero or more steps?
 - (A) $aaba$
 - (B) $aabbbc$
 - (C) $aaAbXc$

2. The set of strings (over Σ) derivable from C in G_* is
 - (A) $L(c^*)$
 - (B) Strings with an even number of cs
 - (C) \emptyset because C is not the start symbol

3. Which of the following is true about grammar G_* ?
 - (a) G_* is ambiguous because abc has two derivations from S
 - (b) G_* is ambiguous because abc has two parse trees
 - (c) G_* is not ambiguous because we can transform the grammar using the techniques discussed in class

$$\begin{aligned}
\delta(q_0, [, \epsilon) &= \{(q_0, A)\} \\
\delta(q_0,], \epsilon) &= \{(q_0, B)\} \\
\delta(q_0, \epsilon, \epsilon) &= \{(q_1, \epsilon)\} \\
\delta(q_1, [, A) &= \{(q_1, \epsilon)\} \\
\delta(q_1,], B) &= \{(q_1, \epsilon)\} \\
\delta(q, a, x) &= \emptyset \quad \text{otherwise}
\end{aligned}$$

Figure 2: Pushdown automata $P_* = (Q = \{q_0, q_1\}, \Sigma = \{[,]\}, \Gamma = \{A, B\}, q_0, F = \{q_1\}, \delta)$ for problems 4 and 5. The transition function δ is given above.

4. Suppose the current instantaneous description of P_* is $\langle q_1, AAAAA \rangle$ and the unread portion of the input is $[][]$. The instantaneous description after one step is
 - (A) The machine crashes
 - (B) $\langle q_1, AAAAAA \rangle$
 - (C) $\langle q_1, AAAA \rangle$
5. The language recognized by PDA P_* is
 - (A) $\{[n]^n \mid n \geq 0\}$
 - (B) $\{[i]^j \mid i \geq j \geq 0\}$
 - (C) $\{wu \mid w, u \in \{[,]\}^* \text{ and } u \text{ is a prefix of } w^R\}$
6. Suppose L is recognized by a linear bounded automata A . Then,
 - (A) A always halts on all inputs because L is decidable
 - (B) L maybe undecidable because A need not halt on all inputs
 - (C) L need not be a context-free language