

THEORY OF COMPUTATION - HOMEWORK 3

Assigned 2019.11.19. Submission deadline 2019.12.03 (for only those who want their homework to be marked).

Problems

1. Consider the following context-free grammar G :

$$Y \rightarrow XYX \mid Z$$

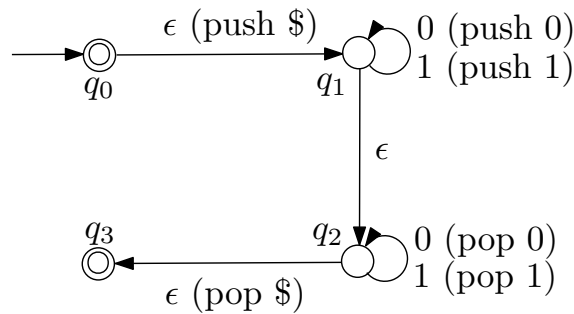
$$Z \rightarrow aTb \mid bTa$$

$$T \rightarrow XTX \mid X \mid \epsilon$$

$$X \rightarrow a \mid b$$

Provide the formal definition of $G = (V, \Sigma, R, S)$ (i.e. specifying V, Σ, R, S). Then give 3 strings in $L(G)$ and 3 strings not in $L(G)$.

2. Consider the following pushdown automaton \mathbf{G} . Provide the formal definition of $\mathbf{G} = (Q, \Sigma, \Gamma, \delta, q_0, Q_a)$ (i.e. specifying $Q, \Sigma, \Gamma, \delta, q_0, Q_a$). Then give 3 strings in $L(\mathbf{G})$, and describe what kind of strings \mathbf{G} accepts.



G

3. Let the alphabet be $\Sigma = \{0, 1\}$, and consider a language $L = \{s \in \Sigma^* \mid \#0(s) > \#1(s)\}$, where $\#0(s)$ means the number of 0's in s and $\#1(s)$ means the number of 1's in s . Design a pushdown automaton \mathbf{G} to accept the language L .
