

Surprise test for 23/3/2021

Problem 1

$$\begin{aligned}(q_0, aabbab, Z_0) &\vdash (q_0, abbab, aZ_0) \vdash (q_0, bbab, aaZ_0) \\ &\vdash (q_0, bab, baaZ_0) \vdash^* (q_0, bab, SaZ_0) \\ &\vdash (q_0, ab, bSaZ_0) \vdash^* (q_0, ab, SZ_0) \vdash (q_0, b, aSZ_0) \\ &\vdash (q_0, \Lambda, baSZ_0) \vdash^* (q_0, \Lambda, SSZ_0) \vdash^* (q_0, \Lambda, SZ_0) \\ &\vdash (q_1, \Lambda, Z_0) \vdash (q_2, \Lambda, Z_0)\end{aligned}$$

Draw the derivation tree for aabbab

Problem 2

Let G be the CFG with productions $S \rightarrow S + T \mid T$ $T \rightarrow [S] \mid a$. Both parts of the question refer to the moves made by the nondeterministic bottom-up PDA $NB(G)$ in the process of accepting the input string $[a + [a]]$.

- If the configuration at some point is $(q_0, +[a]), S[Z_0]$, what is the configuration one move later?
- If the configuration at some point is $(q_0, +[a]), T[Z_0]$, what is the configuration one move later?

Problem 3

Consider the CFG with productions

$$\begin{aligned}S &\rightarrow S_1\$ & S_1 &\rightarrow S_1 + T \mid T & T &\rightarrow T * F \mid F \\ & & F &\rightarrow [S_1] \mid a\end{aligned}$$

- Write the CFG obtained from this one by eliminating left recursion.
- Give a transition table for a DPDA that acts as a top-down parser for this language.
