TD 2 – Syntactic analysis and $LR(k)$ grammars

A. Bonenfant, H. Cassé, E. Rio

1) Are the grammar below $LR(k)$? If the answer is yes, give their analysis table!

$$
\begin{array}{lll}
G_0 & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow C \ C & (1) \\
 & C \rightarrow a \ C & (2) \\
 & C \rightarrow b & (3)
\end{array}
$$

For G_0, parse the word "$abaab\$$".

$$
\begin{array}{llll}
G_1 & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow a \ A \ c & (1) \\
 & A \rightarrow A \ b \ b & (2) \\
 & A \rightarrow b & (3)
\end{array}
\qquad
\begin{array}{llll}
G_2 & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow a \ A \ c & (1) \\
 & A \rightarrow b \ A \ b & (2) \\
 & A \rightarrow b & (3)
\end{array}
\qquad
\begin{array}{llll}
G_3 & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow a \ A \ c & (1) \\
 & A \rightarrow b \ b \ A & (2) \\
 & A \rightarrow b & (3)
\end{array}
$$

$$
\begin{array}{llll}
G_4 & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow S \ a & (1) \\
 & S \rightarrow a & (2)
\end{array}
\qquad
\begin{array}{llll}
G_{4'} & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow a \ S & (1) \\
 & S \rightarrow a & (2)
\end{array}
$$

For G_4 et G'_4, parse the word "$aaaaa\$$". Both grammars accept the same language: which is the best? And why?

$$
\begin{array}{lll}
G_5 & S' \rightarrow S \ \$^k & (0) \\
 & S \rightarrow a \ A \ d & (1) \\
 & S \rightarrow b \ A \ B & (2) \\
 & A \rightarrow c \ A & (3) \\
 & A \rightarrow c & (4) \\
 & B \rightarrow d & (5)
\end{array}
$$

2) Are the grammars below $LALR(k)$? If the answer is yes, give the analysis table.

$$G_6 \quad \begin{aligned} S' &\to S \ \$^k & (0) \\ S &\to a \ U & (1) \\ S &\to U \ b & (2) \\ S &\to a \ b & (3) \\ U &\to c \ U & (4) \\ U &\to \lambda & (5) \end{aligned}$$

$$G_7 \quad \begin{aligned} S' &\to S \ \$^k & (0) \\ S &\to a \ A \ d & (1) \\ S &\to a \ B \ c & (2) \\ S &\to b \ A \ c & (3) \\ S &\to b \ B \ d & (4) \\ A &\to e & (5) \\ B &\to e & (6) \end{aligned}$$