

## Discussion #4: Bottom-Up Parsing

1. Consider the following grammar

$$\begin{aligned}S' &\rightarrow S \\S &\rightarrow CC \\C &\rightarrow cC \mid d\end{aligned}$$

- (a) Construct the LR(1) parsing DFA for this grammar.  
(b) Is the grammar LR(1)? Is the grammar LR(2)? Is the grammar LL(1)? Why or why not?  
(a) Use the parsing table to parse the input `ccdc`. Show the sequence of shift/reduce steps.
2. Consider the following grammar

$$\begin{aligned}E &\rightarrow E + T \mid T \\T &\rightarrow TF \mid F \\F &\rightarrow F^* \mid a \mid b\end{aligned}$$

- (a) Construct an LR parsing table for this grammar.  
(b) Construct an LALR parsing table for this grammar.
3. Show that the following grammar

$$\begin{aligned}S &\rightarrow Aa \mid bAc \mid Bc \mid bda \\A &\rightarrow d \\B &\rightarrow d\end{aligned}$$

is LR(1) but not LALR(1).

4. No LR(1) grammar can be ambiguous. Explain why.