

Parsing Homework
CISC 672 Advanced Compiler Construction
Spring 2006

Due Date: Monday, October 16, 2006 noon.

1. Consider the following grammar:

$$\begin{aligned} S &\rightarrow ABC \mid B \\ A &\rightarrow x \mid Cy \mid \varepsilon \\ B &\rightarrow z \mid wA \mid \varepsilon \\ C &\rightarrow t \mid u \end{aligned}$$

- (a) Compute the FIRST and FOLLOW for each nonterminal S, A, B, and C.
(b) Construct the LL(1) parse table for the grammar.
(c) Is the grammar LL(1)? Justify your answer.

2. Rewrite the following grammar to make it LL(1). Justify that the final grammar is indeed LL(1).

$$\begin{aligned} S &\rightarrow id = E \mid id \text{ in } E \mid E \\ E &\rightarrow E \& G \mid E \$ G \mid G \\ G &\rightarrow a G \mid a b G \mid c \end{aligned}$$

3. Consider the following grammar:

$$\begin{aligned} S &\rightarrow F = T \mid T \\ T &\rightarrow T + j \mid F \\ F &\rightarrow F * \mid a \mid j \end{aligned}$$

- (a) Construct the LR(0) DFA for the grammar.
(b) Construct the SLR(1) parsing table for the grammar.
(c) Is the grammar SLR(1)? Justify.

4. Consider the following grammar

$$\begin{aligned} S &\rightarrow Xe \mid cXd \mid Yd \mid cYe \\ X &\rightarrow w \\ Y &\rightarrow w \end{aligned}$$

- (a) Build the LR(1) DFA for this grammar.
(b) Show that the grammar is LR(1) but not LALR(1).

5. Translate the following regular expression into a context-free grammar:

$$(a^*b|a^*)(ab|b)^*$$