

Discussion #3: Top-Down Parsing

1 LL(1) parsing

Directions: For each of the following grammars,

1. Identify the k for which the grammar is LL(k) parsable. If it's not LL parsable, then explain why.
2. Rewrite the grammar (if needed) so that it is LL(1) parsable.
3. Provide the LL(1) parse table, first using your intuitive understanding of how a predictive parser works, and then using the more formal method of FIRST and FOLLOW sets. Identify the relationship between the two approaches.
4. Provide the parse stack for some non-trivial input.

(a)

$$\begin{aligned} E &\rightarrow T + E \mid T \\ T &\rightarrow \text{int} \mid \text{int} * T \mid (E) \end{aligned}$$

(b)

$$\begin{aligned} S &\rightarrow (L) \mid a \\ L &\rightarrow L, S \mid S \end{aligned}$$

(c)

$$\begin{aligned} E &\rightarrow TE' \\ E' &\rightarrow +TE' \mid \epsilon \\ T &\rightarrow FT' \\ T' &\rightarrow *FT' \mid \epsilon \\ F &\rightarrow (E) \mid \text{id} \end{aligned}$$

(d)

$$\begin{aligned} S &\rightarrow iEtSS' \mid a \\ S' &\rightarrow eS \mid \epsilon \\ E &\rightarrow b \end{aligned}$$