

# CS480

# Translators

LR(1) vs. LALR(1) Parsing

Chap. 4

$$S' \rightarrow S$$

- LR(N)

e...

we need  
carries

$$\text{First}(\alpha) = \{a, b\}$$
$$\text{Follow}(x) = \{ \_, a, b \}$$

- First and Follow?
- Table? T S

$$\begin{array}{l}
 I_0 \quad S' \rightarrow \cdot S', \$ \\
 \hline
 S \rightarrow \cdot X X', \$ \\
 X \rightarrow \cdot a X, a/b \\
 X \rightarrow \cdot b, a/b
 \end{array}
 \begin{array}{l}
 I_1 \\
 I_2 \\
 I_3 \\
 I_4
 \end{array}$$

## Try this – Quiz 8...

- Determine if the Grammar is SLR(1) or LR(1)

$S \rightarrow T \text{ else } F;$

$T \rightarrow E$

$T \rightarrow i;$

$F \rightarrow E$

$E \rightarrow E+i$

$E \rightarrow i$

- Construct a parse table for the grammar
- Add 2 questions for Dr. Stevenson on languages, compilers, or AI

# LR(1) Conditions

1. For any item in the set  $[A \rightarrow \underline{u} \bullet x \underline{v}, a]$  with  $x$  as a terminal, there is no item in the set of the form  $[B \rightarrow \underline{v} \bullet, x]$ . In the action table, this translates no shift-reduce conflict for any state. The successor function for  $x$  either shifts to a new state or reduces, but not both.
2. The lookaheads for all complete items within the set must be disjoint, e.g. set cannot have both  $[A \rightarrow \underline{u} \bullet, a]$  and  $[B \rightarrow \underline{v} \bullet, a]$ . This translates to no reduce-reduce conflict on any state. If more than one non-terminal could be reduced from this set, it must be possible to uniquely determine which is appropriate from the next input token.