

CSCI 447 – Fall 2003

LL Parsing

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Due Date: Wednesday, November 12, 2003

1. (6 pts) For each of the following grammars, find the predict sets and state whether the grammar is LL(1) or not.

a. $S \rightarrow A B c$

$A \rightarrow a | \epsilon$

$B \rightarrow b | \epsilon$

b. $S \rightarrow A b$

$A \rightarrow a | B | \epsilon$

$B \rightarrow b | \epsilon$

c. $S \rightarrow A B B A$

$A \rightarrow a | \epsilon$

$B \rightarrow b | \epsilon$

d. $S \rightarrow a S e | B$

$B \rightarrow b B e | C$

$C \rightarrow c C e | d$

2. (8 pts) Given the following grammar

$lexp \rightarrow (lexpseq) | id | num$

$lexpseq \rightarrow lexp lexptail$

$lexptail \rightarrow , lexp lexptail | \epsilon$

- a. (2 pts) Find the First and Follow sets of all nonterminals
- b. (2 pts) Find the predict sets of all productions
- c. (1 pt) Construct the LL(1) parse table
- d. (3 pts) Show the parsing of $((id , num) , id) \$$ and $(id , (id \$$
3. a) (1.5 pts) Show that an LL(1) grammar cannot be ambiguous.
b) (1.5 pts) Show that a left-recursive grammar cannot be LL(1).
4. (3 pts) Transform the following grammar into LL(1)

$DeclList \rightarrow DeclList ; Decl | Decl$

$Decl \rightarrow IdList : Type$

$IdList \rightarrow IdList , ID | ID$

$Type \rightarrow ScalarType | array (ScalarTypeList) of Type$

$ScalarTypeList \rightarrow ScalarTypeList , ScalarType | ScalarType$

$ScalarType \rightarrow ID | Bound .. Bound$

$Bound \rightarrow Sign INTLIT | ID$

$Sign \rightarrow + | - | \epsilon$