

# CSCI 447 – Fall 2002

## LL Parsing

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**Due Date:** Wednesday, November 13, 2002

1. 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. Given the following grammar

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

$lexpseq \rightarrow lexp lexptail$

$lexptail \rightarrow , lexp lexptail | \epsilon$

a. Find the First and Follow sets of all nonterminals

b. Find the predict sets of all productions

c. Construct the LL(1) parse table

d. Show the parsing of  $(( id , num ) , id ) \$$  and  $( id , ( id \$$

3. a) Show that an LL(1) grammar cannot be ambiguous.

b) Show that a left-recursive grammar cannot be LL(1).

4. Transform the following grammar into LL(1)

$DeclList \rightarrow DeclList ; Decl | Decl$

$Decl \rightarrow IdList : Type$

$IdList \rightarrow IdList , ID | ID$

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

$ScalarTypeList \rightarrow ScalarTypeList , ScalarType | ScalarType$

$ScalarType \rightarrow ID | Bound .. Bound$

$Bound \rightarrow Sign INTLIT | ID$

$Sign \rightarrow + | - | \epsilon$