Homework 5 (corrected)

CS 390 - Spring 2009

Assigned: February 27, 2009 Due: March 12 (Thursday), 2009

1. First and Follow Sets and CFSM

A. Construct the first and follow sets for the following grammar.

 $Lexp \rightarrow Atom \mid List$ $Atom \rightarrow number \mid identifier$ $List \rightarrow (Lexpseq)$ $Lexpseq \rightarrow Lexp \ Lexpseq \mid \varepsilon$

where the terminals are {*number*, *identifier*,(,)}, and the starting symbol is *Lexp*.

B. Construct the CFSM for the following grammer.

 $S \to (L) \mid a$ $L \to SL \mid \varepsilon$ The alphabet is $\{(,),a\}$.

2. Grammers for LL Parsing

- A. Eliminating left-recursion. LL parsers cannot deal with left-recursion, they go into an infinite loop. For each of the following grammers, remove its left-recursion so that it's LL parsable.
 - i. $S \rightarrow S + S|S S|T$ $T \rightarrow T * T|T/T|I$ $I \rightarrow I0|I1|0|1$ ii. $S \rightarrow Sa|Tb|c$ $T \rightarrow Tx|Sy|z$
- B. Eliminating common prefixes (left factoring). LL parsers also cannot handle common prefixes. Use left factoring to remove the common prefixes in the following grammer and make it LL parsable.

- $S \rightarrow xyA|ByB|v$ $A \rightarrow zB|zx|w$ $B \rightarrow y|x$
- C. For each of the following grammers, indicate whether it is LL. If it is not LL, fix it so that it is.
 - i. $S \rightarrow Sxy$ $S \rightarrow SxB$ $S \rightarrow q$ $B \rightarrow Sz$ ii. $S \rightarrow Aw$ $S \rightarrow Bx$ $A \rightarrow yB$ $B \rightarrow zA$ iii. $S \rightarrow Ax$ $S \rightarrow By$ $A \rightarrow zB$ $B \rightarrow z$

3. Writing Recursive-Descent Parsers

Write pseudocode to parse the following grammer by recursive-descent.

 $S \rightarrow (S)S|\varepsilon$