CS 2021 - Written Assignment 2

Due Monday, Nov 8, 2021 at 11:59 PM

This assignment covers context free grammars and parsing. You may discuss this assignment with other students and work on the problems together. However, your write-up should be your own individual work.

1. Page139 Ex3.1
2. Page139 Ex3.6
3. (a) Left factor the following grammar:

$$
\begin{aligned}
S &\to I \mid I - J \mid I + K \\
I &\to (J - K) \mid (J) \\
J &\to K1 \mid K2 \\
K &\to K3 \mid \epsilon
\end{aligned}
$$

   (b) Eliminate left recursion from the following grammar:

$$
\begin{aligned}
S &\to STS \mid ST \mid T \\
T &\to Ta \mid Tb \mid U \\
U &\to T \mid c
\end{aligned}
$$

4. Consider the following CFG, where the set of terminals is $\{a, b, \#, \%, !\}$:

$$
\begin{aligned}
S &\to \%aT \mid U! \\
T &\to aS \mid baT \mid \epsilon \\
U &\to \#aTU \mid \epsilon
\end{aligned}
$$

   (a) Construct the FIRST sets for each of the nonterminals.

   (b) Construct the FOLLOW sets for each of the nonterminals.

   (c) Construct the LL(1) parsing table for the grammar.

   (d) Show the sequence of stack, input and action configurations that occur during an LL(1) parse of the string "#abaa%aba!". At the beginning of the parse, the stack should contain a single S.