University of Nevada, Las Vegas Computer Science 456/656 Fall 2020
Assignment 5: Due Monday November 30, 2020

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. Your answers must be written in a pdf file and emailed to the graudate assistant, Shekhar Singh `shekhar.singh@unlv.edu` by 23:59 November 30. Your file must not exceed 10 megabytes, and must print out to at most 8 pages.

These problems refer to the handout titled "Simple LALR Parsers."

1. Answer the question asked after the tables in Example 1.

2. In this question, refer to Example 2. What follows is the computation if the input is $x - x - x$. Answer the question given after the tables.

$\$_0$	$x - x - x\$$	
$\$_0 x_2$	$-x - x\$$	
$\$_0 E_1$	$-x - x\$$	1
$\$_0 E_1 -_3$	$x - x\$$	1
$\$_0 E_1 -_3 x_2$	$-x\$$	1
$\$_0 E_1 -_3 E_4$	$-x\$$	11
$\$_0 E_1$	$-x\$$	112
$\$_0 E_1 -_3$	$x\$$	112
$\$_0 E_1 -_3 x_2$	$\$$	112
$\$_0 E_1 -_3 E_4$	$\$$	1121
$\$_0 E_1$	$\$$	11212

halt

3. Answer the question given after the tables in Example 4.

4. Answer the question given after the tables in Example 5.

5. Refer to Example 6. Write a computation of that parser with the input $x - (x - x)$.

6. Refer to Example 3. According to your high school algebra teacher (YHSAT), the expression $-x - y$ is evaluted by first computing the additive inverse of the value of x, then subracting the value of y. That corresponds to the precedence determined by Example 3. On the other hand, YHSAT would tell you that the value of $-x * y$ is the additive inverse of x times y, but C++ would compute the product of $-x$ and y. You might think that it doesn't matter, but it does. Operators can be overloaded in some programming languages as well as in the literature, and $(-x) * y$ might not equal $-(x * y)$.

   If you change Example 3, replaceing subtraction with multiplication, your parser will be consistent with C++. But what if, instead, you want to please YHSAT? Using Example 3 as a guide, define an LALR parser for the grammar below which is consistent with what YHSAT wants.

   1. $E \rightarrow x$
   2. $E \rightarrow E * E$
   3. $E \rightarrow -E$