University of Nevada, Las Vegas Computer Science 456/656 Spring 2021
Assignment 4: Due Friday October 14 2022, 11:59 PM

This is the complete assignment.

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. Turn in the assignment in the manner given to you by our grader, Janeen Sudiacal.

1. Let L be the language of all binary numbers for non-negative integers that are equivalent to 2 modulo 3, where leading zeros are allowed. Give a regular expression for L.

2. Let L be the language accepted by the DFA shown below. Give a regular expression for L.
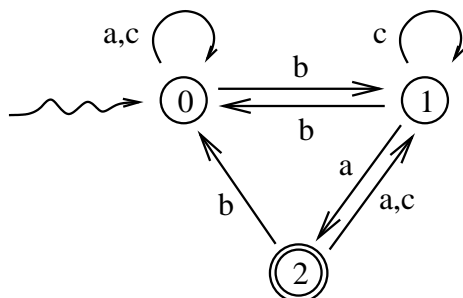
3. Let $L = \{a^n b^{2n} : n \geq 0\}$. Draw a PDA that accepts L.

4. Correctly state (not prove) the pumping lemma for regular languages, then use the pumping lemma to prove that the language L given in Problem 3 is not regular.

5. (a) Resolve the paradox given in the handout `recenum.pdf`.

   (b) Describe a specific language which is not recursively enumerable.

6. Prove that the halting problem is undecidable.

7. Consider the following CF grammar and LALR parser.

1. $S \rightarrow i_2 S_3$
2. $S \rightarrow i_2 S_3 e_4 S_5$
3. $S \rightarrow w_6 S_7$
4. $S \rightarrow a_8$

	ACTION					GOTO
	a	i	e	w	$\$$	S
0	s8	s2		s6		1
1					halt	
2	s8	s2		s6		3
3			s4		r1	
4	s8	s2		s6		5
5			r2		r2	
6	s8	s2		s6		7
7			r3		r3	
8			r4		r4	

Walk through the computation of this parser where the input string is *iiwaeia*.