

Compilers [Fall 2016]

Test I

NAME: _____

Instructions:

- 1) This test is 7 pages in length.
- 2) You have 75 minutes to complete and turn in this test.
- 3) Essays will be graded on how clearly you've communicated the necessary ideas. Write in complete English sentences.
- 4) This test is closed books, notes, papers, friends, phones, neighbors, smartwatches, etc.
- 5) Use the backs of pages in this test packet for scratch work. If you write more than a final answer in the area next to a question, circle your final answer.
- 6) Write and sign the following: "I pledge my Honor that I have not cheated, and will not cheat, on this test."

Signed: _____

1. [20 points]

Draw a minimum-state DFA recognizing all binary numbers matching $(1^*|00)^*1(0|1^*)$.

2. [20 points]

a) Complete the parse trace below according to the following LR parse table for CFG G_1 .

	x	y	\$	E	T
0	s2,r3	r3	r3	g1	
1		s4	a		g3
2	r2	r2	r2		
3	r1	r1	r1		
4	r4	r4	r4		

G_1 is:

0 $S \rightarrow E\$$

1 $E \rightarrow ET$

2 $E \rightarrow x$

3 $E \rightarrow \epsilon$

4 $T \rightarrow y$

Stack

Input
y\$

Action

b) Is the table shown above an SLR parse table for G_1 ? Show enough work to convince me that you're not guessing. ☺

3. [40 points]

G_2 is:

0	S	->	O\$
1	O	->	POCO
2	O	->	x
3	O	->	ϵ
4	P	->	C
5	C	->	O

a) Draw an LALR parse table for G_2 .

G_2 is:

0	S	->	O\$
1	O	->	POCO
2	O	->	x
3	O	->	ϵ
4	P	->	C
5	C	->	O

b) Draw an LL(1) parse table for G_2 .

c) Rewrite G_2 into an equivalent G_2' that's in LL(1). Show the LL(1) parse table for G_2' .

d) Rewrite G_2 into an equivalent G_2'' that's in LR(0). Show the LR(0) table for G_2'' .

4. Essay [20 points]

Describe the architecture of sim-dism; how is it organized? Be sure to explain the basic breakdown into source files, what each file contains, the commands to compile the simulator, and what those commands do.

Undergraduates stop here. The remaining problem is for graduate students.

5. [10 points]

G_3 is:

0 $S \rightarrow L\$$
1 $L \rightarrow (L) L$
2 $L \rightarrow \epsilon$

G_4 is:

0 $S \rightarrow L\$$
1 $L \rightarrow L (L)$
2 $L \rightarrow \epsilon$

Prove or disprove (i.e., refute) that G_3 and G_4 are equivalent. More-formal proofs/refutations will receive more credit than less-formal proofs/refutations.