Compilers [Fall 2015]
Test I

NAME: _____

Instructions:

1) This test is 8 pages in length.

2) You have 75 minutes to complete and turn in this test.

3) Short answer questions include a guideline for how many sentences to write. Respond in complete English sentences.

4) This test is closed books, notes, papers, friends, phones, neighbors, 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. [5 points]
As discussed in class, where may *yytext* appear, and to what does it refer? [1-2 sentences]

2. [10 points]
Compare and contrast compilers and interpreters. What are example(s) of each that we've discussed in class? [2-4 sentences]

3. [10 points]
Fill in the blanks:
a) A flex-style RE matching DJ identifiers is _____.

b) A flex-style RE matching DISM labels is _____.

4. [25 points]
(a) Draw a minimum-state DFA accepting exactly the *ternary* numbers that are multiples of 4, *excluding* the empty string and numbers with leading 0s.

(b) Write an RE matching exactly the even ternary numbers, again excluding the empty string and numbers with leading 0s. Avoid making the RE significantly more complicated than necessary.

5. [10 points]
Complete the parse trace below according to the following LR parse table for CFG G_1.

	x	y	$	E	T
0	s2	r3	r3	g1	
1		s4	a		g3
2		r2	r2		
3		r1	r1		
4	s5				
5		r4	r4		

G_1 is:

```
0     S -> E$
1     E -> ET
2     E -> x
3     E -> ε
4     T -> yx
```

Stack	Input	Action
	xyxy$	

4

6. [40 points]
G is:

```
0      S -> I$
1      I -> CFI
2      I -> t
3      C -> F
4      C -> b
5      F -> n
6      F -> ε
```

a) Draw an LL(1) parse table for G. Hint: The table should have at least one conflict.

b) Rewrite G into an equivalent G' and prove that G'∈LL(1).

G is:

```
G is:            0   S -> I$      1   I -> CFI     2   I -> t
3   C -> F       4   C -> b       5   F -> n       6   F -> ε
```

c) Draw an LALR parse table for G.

G is:

```
0      S -> I$
1      I -> CFI
2      I -> t
3      C -> F
4      C -> b
5      F -> n
6      F -> ε
```

d) Prove or disprove that G is ambiguous.

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

G is:
```
0     S -> I$
1     I -> CFI
2     I -> t
3     C -> F
4     C -> b
5     F -> n
6     F -> ε
```

e) [12 points]
Draw the initial state of G's LR(2) DFA.