

Compilers [Fall 2015]

Test II

NAME: _____

Instructions:

- 1) This test is 7 pages in length.
- 2) You have 75 minutes to complete and turn in this test.
- 3) Prose-response questions include a guideline for how much write. Respond in complete English sentences. Essays should be well organized and readable.
- 4) This test is closed books, notes, papers, friends, 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. [3 points]

What's one interpreter we've discussed at length in class?

2. [7 points]

What's ANTLR? Hit all the main points we discussed in class. [1-2 sentences]

3. [10 points]

How do strongly typed languages prevent buffer-overflow vulnerabilities? [1-2 sentences]

4. [25 points] G is: 0 $S \rightarrow E\$$ 1 $E \rightarrow T+E$ 2 $E \rightarrow T$ 3 $T \rightarrow n$ 4 $T \rightarrow \epsilon$
(a) Draw an SLR parse table for G.

(b) Show an SLR parse trace for the input string $n+n++\$$. If the trace ever reaches a state of conflict, simply write “conflict” at that point and stop the trace.

5. [15 points]

Let $S = LL^* \setminus LR(1) \setminus LR(2) \setminus \dots$

Either: (a) show that S is empty, or

(b) define an element e of S , and show that e really is an element of S .

6. [40 points] [Essay] [You have two pages to respond.]

Let's add for-loops to DJ. The expression form is $for(e_1; e_2; e_3)\{el\}$, where el is a nonempty expression list. These loops work as in other languages (such as C and Java), except that upon completion they always evaluate to 0. E.g., the DJ program `main{nat i; printNat(for(i=0;3>i;i=i+1){printNat(i);});}` prints 0, 1, 2, 0.

Assuming `dj2dism` is set up as discussed in class, describe how each phase of the compiler needs to change (if at all) to accommodate for-loops. Provide pseudocode when helpful.

(This page provides additional space for Problem 6.)

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

7. [15 points]

Now suppose that we want to add arrays to DJ, and to extend dj2dism to support this addition. Can we still encode types conveniently as integers in dj2dism? If so, how? If not, why not? [1-4 sentences]