

# Compilers [Fall 2015] Practice Test II

NAME: \_\_\_\_\_

## Instructions:

- 1) This test is 4 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, 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]

What is a compiler? [1 sentence]

2. [10 points]

Contrast strongly and weakly typed languages. [1-2 sentences]

3. [20 points]

Make a list of all the errors in the following DJ program (which has line numbers annotated on the left-hand side). For every error you find, indicate (1) the line number on which the error occurs, (2) whether the error is lexical, syntactic, or semantic, and (3) a brief description of the error if it is a lexical or semantic error.

```
1    class C1 extends C2 {}
2    class C2 extends Object {}
3    class C3 extends C4 {}
4    class c6 extends C4 {}
5    class C4 extends C2 {}
6    Main {
7        nat n;
8        n = 3.4;
9        n = 7j;
10       n = j7;
11       n = (8/8);
12       n+1 = !4;
13       n.n = 5;
14    }
```

4. [25 points]

Consider the following lexically and syntactically valid DJ program:

```
class A extends Object {}
class B extends Object {}
class C extends B {}
class D extends B {}
class E extends D {}
class F extends A {}
class G extends B {}
class H extends G {}
class I extends A {}
class J extends E {}
main {
  H x;
  J y;
  if(0) {x;} else {y;};
}
```

a) Is  $I \leq C$ ?

b) Is  $C \leq I$ ?

c) What is  $I \vee C$  ?

d) What is  $J \vee D$ ?

e) Is  $D \leq D$ ?

f) What is  $D \vee D$ ?

g) Is the main block well typed?

h) If the main block is badly typed, what is its type error? If the main block is well typed, what is the type of its if-then-else expression?

5. [20 points]

Define one element of  $(LR(0) \cap LL(2)) \setminus LL(1)$ .

(“ $\setminus$ ” is the set difference/subtraction operator; e.g.,  $\{5,6\} \setminus \{5\} = \{6\}$ .)

6. [20 points]

Assuming code generation as discussed in class, provide a pseudocode implementation of codegen for the expression  $if(e)\{el_1\}else\{el_2\}$  in dj2dism.