

Computer Science Comprehensive Exam—Fall 2000
Programming Languages

Instructions: Do not put your name on the exam, please answer all the questions directly on the exam itself. Answer **all** the questions; you have 60 minutes. Explain answers as fully as possible, give examples if appropriate, define terms. Answer first, the questions you know best.

1. Some languages (for example, Java) permit assignment to call-by-value parameters in the body of the subprogram. Is this a good idea? Explain.

2. What is type inference?

3. Explain why some programming languages forbid returning subprocedures? Yet the language C does not, explain.

4. What is data abstraction? Explain using floating-point numbers as an example. What mechanism do programming languages have for user-defined data abstraction?

5. Some object-oriented languages have multiple inheritance. Yet the designers of Java chose single inheritance. Please explain the issue and explain the rationale of the Java designers.

6. Exception handling in ML, Ada, C++, Modula-3, and Java is pretty much alike in general. Describe some of the differences.

7. What is the type of the following ML function? Describe in a few words what the function does.

```
fun map f nil      = nil |
    map f (h::t) = (f h) :: (map f t);
```

8. Explain the occurs check in unification. What role does the occurs check play in PROLOG?