Computer Science Comprehensive Exam—Spring 2000 Programming Languages

Instructions: Do not put your name on the exam, please answer all the questions directly on the exam itself. You must answer the **last two questions** and five of the remaining questions.

Explain answers as fully as possible, give examples if appropriate, define terms. Answer first, the questions you know best. Circle the problem number of the (2 + 5 = 7) problems you choose to have graded.

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1.	What is the	difference b	oetween a co	empiled and	an interp	reted langu	ıage? Wh	nich one	is Java	?
2.	What is a functional la		rogramming	g language?	Why are	e they imp	ortant?	Name a	t least	two

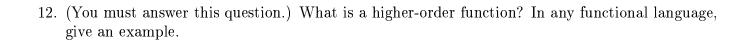
3.	What are regular expressions? Where are the used?
4.	What is a type insecurity? Why is it bad? Give an example from Pascal (or elsewhere).

5. All imperative languages have a for loop that executes a predetermined number of times. Some small differences in the for exist between different languages. Explain clearly what some of these differences are.

6. Consider two separate, independent executions of the following Ada-like program. Assuming that X is passed by value, what are the values of I and A after the call? Assuming that X is passed by reference, what are the values of I and A after the call?

7.	What	is a p	roced	ure c	losure	?		
8.	What	are op	paque	and	transp	oarent	data	types?

9.	In every language since PL/I, exception propagation is essentially the same. propagation as in, for example, ML, Ada, C++, Modula-3, and Java.	Describe exception
10.	What is type inference?	
11.	The two kinds of functional languages are eager and language of each kind.	Give the name of a



13. (You must answer this question.) Consider the following PROLOG clauses (x, h, t, and z are variables):

$$A([],x,x)$$
.
 $A([h|t],x,[h|z]) := A(t,x,z)$.

What are the answers to the following queries (x, and y are variables)? If there is more than one solution, give any two of them.

- (a) A([E],[],[E])?
- (b) A([E],[],[E,F])?
- (c) A([],[],x)?
- (d) A([E],[],x)?
- (e) A([E],[F],x)?
- (f) A([E,F,G],[H,I],x)?
- (g) A(y,[H,I],[G,H,I])?
- (h) A(x,y,[E,G,I])?
- (i) A([x|y],[H,I],[G,H,I])?
- (j) A([x|F],[y|H,I],[E,F,G,H,I])?