Department of Computer Science & Engineering

CS 329 Principles of Programming Languages

Quiz I **20 Marks (14+6)**

Aug 29/2008, 9:00-10:30 am *Solve all problems*

About the use of language: it is impossible to sharpen a pencil with a blunt axe. It is equally vain to try to do it with ten blunt axes instead. – (1975) Edsger Dijkstra.

1. The following program in a hypothetical language is to be type checked. As you can see, the language includes variables, value creation, assignment statements, function types and variables, function calls and parameter passing. Formulate rules such that all such programs in this language can be type checked statically. No runtime checking is available for this language.

   * Do rough work elsewhere, and in your answer, one by one, list only the rules that you end up formulating, and for each rule also note the applicable line numbers.

```
1. F:S->T, G:P->Q; H:R->S; // types declared
2. F f; // no implementation assigned to f
3. G g (p){. body ..} // implementation defined for g, g of type G
4. H h (r) {... body ...} // imple. defined for h, h of type H
5. if (some condition C) then f = h; else f = g;
                conditional assignment of imple. to f
6. A a = new J;   // creation type and var type are different
// assignment statement with expression on the right side
7. B b = new K;
8. C c;
9. c = b; // another assignment statement with variables
10. b = f (c); // function call, parameter passed, return result
// assigned
```

2. To illustrate the effectiveness of your rules, provide two interesting cases which can respectively be declared as *type safe* and *type unsafe* by a type checker based on your rules. Do rough work elsewhere, and in your answer, only write your final programs and mention rule numbers applied against each line along with the conclusions (safe/unsafe).