Faculteit der Exacte Wetenschappen	Tentamen Principes van Programmeertalen
Vrije Universiteit	28-06-2005

Questions can be answered in Dutch or English.

1. Give a short characterization of each of the following paradigms:
   - **a.** imperative
   - **b.** object-oriented
   - **c.** real-time

2. Explain briefly the following programming language terms:
   - **a.** overloading
   - **b.** aliasing

3. Block, scope and visibility.
   - **a.** Explain the difference betweeen a block, the scope of a variable and the visibility of a variable.
   - **b.** Give an example which illustrates the difference between scope and visibility.

4. Imperative languages:
   - **a.** What is a repeat-until statement and what problem does it have?
   - **b.** What is an exit statement and what problem does it have?

5. Lazy evaluation:
   - **a.** Explain briefly what is meant by "lazy evaluation".
   - **b.** Postscript has no lazy evaluation and always evaluates all operands. For the if operation this is undesirable, since both branches of the if would be evaluated. What is the mechanism to prevent this?

6. Functional languages:
   - **a.** Why do lazy functional languages feature lists rather than arrays?
   - **b.** Write a function `index a n` which delivers the `n`-th element of the list `a`, if it exists.
   - **c.** What happens if `n` is negative in a call of `index`?

7. Logic languages:

   a. Describe the search order of clauses and goals in Prolog.

   b. When processing a program that describes a finite search tree, for example the 8-queens problem, what would be the effect of a different search order?

8. Parallel and distributed languages:

   a. Explain briefly how a shared buffer can be implemented using a monitor.

   b. In particular, show what happens when a process tries to place an item in a buffer that is already full.

9. Other paradigms:

   Explain briefly how the OK oracle in SETL works.

Puntentelling:

Vraag	1	2	3	4	5	6	7	8	9
a	4	3	6	6	3	6	3	6	10
b	3	3	4	5	5	5	7	4	
c	4					3			
	11	6	10	11	8	14	10	10	10

Totaal: 90 punten.