Informatica Teorica. December 2006.

1. Discuss the monotonicity and continuity properties in the streams example of Winskel's book. Why those two properties are important from a computational point of view? Give a sufficient condition A so that: (A and monotonicity) implies continuity.

2. Prove that the set of the continuous functions from a cpo A to a cpo B is itself a cpo. How functions are ordered in a cpo of functions?

3. Define a first-order functional language and give the call-by-name and call-by-value operational and denotational semantics.

4. Present the local model checking.

5. State and illustrate the relative completeness theorem of the Hoare's calculus of triples. Give a proof of why this calculus is undecidable.

6. Give the rules for the construction of the least Herbrand Model of a definite logic program.

7. Compute the minimal and the maximal fixpoints of the equation X = a X + b, where the unknown X is a CCS term.

8. Determine the weakest precondition P1 of the program
   ```
   {P1}  WHILE false DO x = x + 1; x = x -1 OD  {12 =< x =< 48}
   ```

9. Determine the weakest precondition P2 of the program
   ```
   {P2}  WHILE P2 DO x = x + 1 OD  {x = 48}
   ```

The result of this test is combined with that of the take-home exam.