1997 Paper 9 Question 10

Denotational Semantics

Define the types and terms of the language PCF. Describe the denotational semantics of PCF using domains and continuous functions. In what sense is the denotational semantics of PCF *compositional*?   [12 marks]

Explain the *soundness* and *adequacy* properties of the denotational semantics with respect to the operational semantics of PCF. (A definition of the PCF operational semantics need not be given.)   [4 marks]

Define the notion of *contextual equivalence* for PCF terms. Explain why the compositional, soundness and adequacy properties mentioned above imply that if two closed PCF terms of the same type have equal denotation, then they are contextually equivalent.   [4 marks]