2005 Paper 6 Question 11

Semantics of Programming Languages

(*a*) Discuss the operational semantics and type rules for subsumption and downcasting in a language with record subtyping. Identify clearly what is guaranteed by type-checking and run-time checks. [8 marks]

(*b*) Explain, with examples, the subtype rule for function types $T_1 \to T_2$. [4 marks]

(*c*) Explain, with examples, how a language with record subtyping, functions, and ML-style references can be used to express simple object idioms. [8 marks]