1999 Paper 6 Question 9

Semantics of Programming Languages

Give the rules for *call-by-value* and *call-by-name* evaluation of function applications in the language LFP combining state-manipulating commands with function abstraction and application. [5 marks]

Is the call-by-value evaluation relation contained in the call-by-name evaluation relation? Is the call-by-name evaluation relation contained in the call-by-value evaluation relation? Justify your answer in each case. [6 marks]

Briefly describe how a type system for LFP can be used to detect statically that some LFP terms do not cause side-effects on the state under call-by-name evaluation. What happens for call-by-value evaluation? [9 marks]