

2006 Paper 7 Question 9

Types

- (a) Give the typing rules for the Mini-ML language with booleans, conditionals, function abstraction and application, local declarations, nil, cons and case expressions. Make the form of the typing judgement clear and explain any auxiliary relations used in the side-conditions of the rules. [8 marks]
- (b) What is a *principal* type scheme for a closed Mini-ML expression? State without proof the Hindley–Damas–Milner theorem for the Mini-ML typeability problem. [5 marks]
- (c) Which of the following Mini-ML expressions are typeable? Give the principal type scheme for any of the expressions that are typeable.
- (i) $\lambda x(x :: \text{nil})$ [2 marks]
- (ii) $\lambda f(f(f :: \text{nil}))$ [2 marks]
- (iii) $\text{let } f = \lambda x(x :: \text{nil}) \text{ in } f(f :: \text{nil})$ [3 marks]