COMPUTER SCIENCE TRIPOS Part II – 2013 – Paper 9

14 Types (AMP)

(*a*) Give the Mini-ML typing rule for expressions of the form $\texttt{let}\, x = M_1\, \texttt{in}\, M_2$. How and why is this rule modified in the full ML language? [5 marks]

(*b*) Given a Mini-ML typing problem $\Gamma \vdash M : ?$, define what is a solution for it and what it means for a solution to be principal. [3 marks]

Do the following Mini-ML typing problems have solutions? Justify your answer in each case.

(*i*) $f : \forall\,\{\}\,(\alpha \to \beta) \vdash (f\,\texttt{true})\,f : ?$ [3 marks]

(*ii*) $f : \forall\,\{\beta\}\,(\alpha \to \beta) \vdash (f\,\texttt{true})\,f : ?$ [4 marks]

(*iii*) $f : \forall\,\{\}\,(\alpha \to \beta) \vdash \texttt{let}\, f = \lambda x(\lambda y(y))\, \texttt{in}\, (f\,\texttt{true})\,f : ?$ [5 marks]