

13 Types (nk480)

Consider the simply-typed lambda calculus with only function types and boolean types, with true, false, and if-then-else term formers for the boolean type.

- (a) Define a logical relation suitable for establishing the termination of programs in this language. [4 marks]
- (b) State the closure property of the logical relation. [2 marks]
- (c) Prove closure for the case of the boolean type. [6 marks]
- (d) State the fundamental lemma for this language. [2 marks]
- (e) Prove the fundamental lemma for the if-then-else case. [6 marks]