2003 Paper 12 Question 10

Introduction to Functional Programming

(a) Give a definition of an ML datatype bool_exp to describe Boolean expressions built up from named variables using Boolean operations of conjunction, disjunction and negation:

For example, the Boolean expression $((A \vee B) \wedge \neg C) \wedge D$ would be given by

- (b) Write an ML function variables which takes an argument e of type bool_exp and returns a value of type string list which lists all variables occurring in e. [8 marks]
- (c) Write an ML function eval which takes two arguments—e of type bool_exp and a of type (string * bool) list giving a value for each variable—and returns the value of the expression e under the assignment a. [8 marks]