

1995 Paper 7 Question 12

Types

Give rules for deriving ML typing assertions of the form

$$x_1 : \sigma_1, \dots, x_n : \sigma_n \vdash M : \sigma$$

You may assume that the types $\sigma_1, \dots, \sigma_n, \sigma$ are built up from type variables and a type of booleans using function-, product-, and list-type constructors, and that the expressions M involve only identifiers, true, false, abstraction, application, projections, pairing, nil, cons, and let-declarations. [5 marks]

What does it mean for one ML type to be *more general* than another? What is meant by the *principal type* of a closed ML expression? [3 marks]

Give an account of an algorithm for deciding typability and producing principal types for the above fragment of ML. (Facts about unification may be quoted without proof.) [12 marks]