Types

Give rules for deriving ML typing assertions of the form

\[ x_1 : \sigma_1, \ldots, x_n : \sigma_n \vdash M : \sigma \]

You may assume that the types \( \sigma_1, \ldots, \sigma_n, \sigma \) 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]