1998 Paper 1 Question 5

Foundations of Computer Science

This question has been translated from Standard ML to OCaml

Discuss how lazy lists and mutable lists can be coded in OCaml. How do they compare with OCaml's built-in lists? Illustrate your answer by considering the operations of reversing a list and of concatenating two lists. Your discussion should mention the main programming hazards. [6 marks]

The function `odds` is to return the list of alternate elements of its input. For example, `odds [a; b; c; d; e] = [a; c; e]` and `odds [a; b] = [a]`. Code `odds` using

(*a*) ordinary OCaml lists [3 marks]

(*b*) lazy lists [5 marks]

(*c*) mutable lists (as an imperative operation — so that `odds` has type `'a mlist -> unit` for a suitable variant type `'a mlist` of mutable lists, to be defined) [6 marks]