

## 1998 Paper 12 Question 8

### Prolog for Artificial Intelligence

Write Prolog programs that define the following predicates. Your programs should ensure that backtracking does not produce spurious alternative solutions.

- (a) The  $n$ th element of a list: `nth(X,N,L)` instantiates  $X$  to the  $N$ th element of list  $L$ . Assume that list elements are numbered increasing from 1. [4 marks]
- (b) The last element of a list: `last(X,L)` instantiates  $X$  to the last element of list  $L$ . [4 marks]
- (c) Remove an element from a list: `remove(X,L,M)` instantiates  $M$  to a list containing all the elements of list  $L$  except for every occurrence of term  $X$ . [6 marks]
- (d) Substitute one element for another: `subst(L,X,Y,M)` instantiates  $M$  to a list containing all the elements of list  $L$  except that every occurrence of term  $X$  in  $L$  is replaced by term  $Y$  in  $M$ . [6 marks]