# 1993 Paper 3 Question 4

## Prolog

The following Prolog clauses define the procedures named `perm` and `select`. The goal `perm(X,Y)` succeeds for the list `X`, instantiating `Y` to a permutation of list `X`. Successive backtrackings will enumerate each possible permutation. For example, evaluating the goal `perm([a,b,c],Q)` will instantiate `Q` successively on each backtracking to: `[a,b,c]`; `[a,c,b]`; `[b,a,c]`; `[b,c,a]`; `[c,a,b]`; `[c,b,a]`.

```
select(H,[H|T],T).
select(H,[N|T],[N|L]) :- select(H,T,L).

perm(X,[H|T]) :- select(H,X,Z), perm(Z,T).
perm([],[]).
```

Explain how procedures `perm` and `select` work, using a small example. [20 marks]