1994 Paper 1 Question 7

Show, by defining suitable selector and constructor functions, how the ML type defined as follows:

```
datatype L = N of int * unit->L;
```

can be used in the representation of lazy integer lists.   [5 marks]

Define a function `makeseq(f)` that will yield a lazy list representing the following infinite sequence:

```
0, f(0), f(f(0)), ...
```

where the integer at position i has the value $f^i(0)$.   [5 marks]

Define a function '`matches s seq`', where `s` is of type `int list` and `seq` is a lazy list, that will yield a lazy list of integers giving the positions where `s` matches consecutive items in `seq`. For example, if `matches [1 1]` is applied to the lazy list

```
1,1,2,1,1,1,0,1,2,1,1,...
```

it will produce a lazy list starting

```
0,3,4,9,...
```

                    [10 marks]