Foundations of Computer Science

This question has been translated from Standard ML to OCaml

Give the declaration of an OCaml variant type that could be used in the representation of a lazy list of integers, and illustrate its use by defining a function `ints` that when given an argument `n` yields a lazy list of integers from `n` to infinity. [5 marks]

The decimal representation of a real number in the range 0 to 1 is to be represented as an infinite sequence of the decimal digits following the decimal point (0.d₁d₂...). Define a function `mknumb` which when applied to the digit function `dig` will construct a lazy list of these digits where the i<sup>th</sup> digit (d<sub>i</sub>) is given by `dig i`. [5 marks]

Suppose we have an infinite sequence of such numbers [r₁, r₂,...], in which the digits of the decimal expansion of r<sub>i</sub> are given by the digit function f<sub>i</sub>, and that the collection of digit functions is represented by the lazy list [f₁, f₂,...]. Define suitable types for the list of numbers and the list of digit functions. [5 marks]

Define a function `newnumb` which when given the lazy list of digit functions will yield a lazy list of digits that have the property that its i<sup>th</sup> digit differs from the i<sup>th</sup> digit of r<sub>i</sub>. [5 marks]