402   (decimal-point numbers) Using recursive data definition, define the bunch of all decimal-point numbers. These are the rationals that can be expressed as a finite string of decimal digits containing a decimal point. Note: you are defining a bunch of numbers, not a bunch of texts.

After trying the question, scroll down to the solution.

§   If we're just allowed digits and a decimal point, they're non-negative. Let's call it *dec* .
We can define it as

$$dec = nat / 10^{nat}$$

but that doesn't use recursive data definition that we were asked to use. The following
axioms do.

     $nat, dec/10\colon dec$ construction

     $nat, B/10\colon B \;\Rightarrow\; dec\colon B$ induction

or

     $dec = nat, dec/10$ fixed-point construction

     $B = nat, B/10 \;\Rightarrow\; dec\colon B$ fixed-point induction

But these axioms use *nat* , which already gives us construction and induction. So maybe
we should try for a definition that doesn't use *nat* .

     $0, dec+1, dec/10\colon dec$ construction

     $0, B+1, B/10\colon B \;\Rightarrow\; dec\colon B$ induction

or

     $dec = 0, dec+1, dec/10$ fixed-point construction

     $B = 0, B+1, B/10 \;\Rightarrow\; dec\colon B$ fixed-point induction