

sci.logic: Re: \*\*\*\*\* TRY THESE SCI.MATH \*\*\*\*\*

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Some advice: stop thinking of the real numbers in terms of their decimal expansions, it only seems to be confusing you. The decimal expansion only describes a way (one among many) of describe an approximation to a real number to arbitrary precision.

Also, you seem to be mixing the issues of uncountability of the reals and computability questions, which are only slightly related.

You already got answers to your questions, as far as they were well-defined, so I won't bother going through them. You seem to be asking: is it possible to write a list of numbers which contains arbitrarily good approximations to every real number? And the answer is YES: for example, the rationals.

Topologists would say: the real numbers have a countable dense subset (such spaces are sometimes called separable). This does NOT mean that the set of real numbers itself is countable – perhaps this is where you have a problem of understanding?

The issue of computability is worse: you can easily define a single number whose decimal expansion is not computable: e.g., let the n-th digit be 1 if the n-th Turing Machine halts, and 0 otherwise. There is no program which, given input k, outputs the first k digits of this number.

Hope this helps,  
Lasse

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