

Re: New countable infinity logic

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> *From: "/-|erc" <spam@fodder.abc>*
> *Say you have an *infinite* list of computable real numbers.*

Do you mean a mapping from the positive (or non-negative) integers such that the result of each mapping is a computer program which when run would generate more and more digits of some particular real number, such that if the program were let run forever it would eventually produce any digit whatsoever of that particular real number?

If that's what you mean, it's impossible for your mapping to include *all* computable real numbers, and simultaneously your mapping itself to be computable.

> *if you can't iterate through a tree data structure you never studied*
> *programming*

If the tree structure you're using is binary, where each branch determines the next bit in the binary representation of some real number (or you can have 10-way branching to directly generate decimal digits, etc., any finite base of number representation binary ternary etc. works the same), then this tree traversal has nothing to do with your original question.

Yes you can surely traverse such an infinite tree in the sense that you can do a breadth-first search which gets the root node then the two 1-deep nodes then the four 2-deep nodes etc., eventually reaching any desired node you want at any finite depth.

But real numbers aren't these nodes. Real numbers are the ends of the infinitely long zigzaggy branches, which exist only in the sense of an epsilon-delta limit definition, they are not actually part of your tree, just a bunch of additional points derived from your tree by feeding an infinitely-long zigzaggy branch into the epsilon-delta definition of limit. Your tree-traversal will reach every finite prefix of the binary (or other base) representation of every real number, but will never reach even *one* of the actual real numbers, much less all of them.