Re: how to list all of the real numbers

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- *From*: lwalke3@xxxxxxxxx
- *Date*: Sat, 11 Aug 2007 22:47:26 −0700

On Aug 11, 7:29 pm, Virgil <vir...@xxxxxxxxxxx> wrote:

> Most mathematicians will consider systems of infinitesimals possible,
> but unless their own work makes such infinitesimals useful, they are not
> liable to spend much energy or time on them.

"Crank" #1: Why accept the Axiom of Infinity?
Standard Mathematician: Because it is useful.
"Crank" #2: Why reject infinitesimals?
Standard Mathematician: Because they are not useful.

So far in both this thread and in "An Inconvenient Truth" the
consensus
among standard mathematicians is that the infinite sets are "useful,"
(in response to HdB's claims that the Axiom of Infinity is not useful)
while infinitesimals are not "useful," which is why the former is part
of standard (or classical) analysis while the latter is relegated to
Nonstandard Analysis.

The difference? The best argument I've seen is that it's not the
infinite sets themselves that are "useful," but the complete ordered
field that is important to the solution of differential equations. It
was stated that a complete ordered field cannot contain
infinitesimals,
for the set of infinitesimals are a set with no least upper bound. In
NSA differential equations become difference equations (with
infinitesimal differences), while integrals become sums of infinitely
many infinitesimals. And since differential equations and integrals
are easier to work with than (even finite) difference equations and
summations, infinitesimals are to be rejected. But one must assume
the Axiom of Infinity in order to prove that a complete ordered field
even exists.

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