Re: Well Ordering the Reals

Source: http://sci.tech−archive.net/Archive/sci.math/2006−03/msg01787.html

- *From*: Tony Orlow <aeo6@xxxxxxxxxxx>

- *Date*: Fri, 10 Mar 2006 13:09:25 −0500

David R Tribble said:

> Tony Orlow wrote:
>
> > 1. 0<x<=1 −> finite(x)
> > 2. finite(x) −> finite(0−x)
> > 3. finite(x) −> finite(1/x)
> > 4. finite(x) −> finite(2^x)
>
> David R Tribble said:
>
> > The rules say nothing about "non−finite" numbers, however, so it's
> > impossible to see how they show that Peano's 5th axiom implies the
> > existence of infinite naturals.
>
> Tony Orlow wrote:
>
> > I believe I had added:
> > 5. x<>0 and not(finite(x)) −> infinite(x)
>
> Tony Orlow wrote:
> David R Tribble said:
>
> > Which, given the definitions above, looks like an empty set.

David R Tribble said:

> Rule 1 says that all x in (0,1] are finite.
> Rule 2 says all x<0 are finite.
> Rule 3 says all x>1 are finite.
> Rule 5 says that 0 is not finite nor infinite.
>
> So there are no values of x derivable from your rules that satisfy infinite(x).

Tony Orlow wrote:

> Not if you can't properly read the rules.

It's a waste of time, but let's try again:

Rule 1 say that all x in (0,1] are finite.
(Maybe − you don't define x, so we can't be sure about this.)

Correct

Rules 1 and 3 define all x>0 to be finite.

Only finite x. Since 0 is not included as finite, 1/0 is also not included as finite, but the reciprocal of any finite is finite.

Rules 1, 2, and 3 define all x<>0 to be finite.

Rule 2 says that if x is finite, then the negative of x is finite, so 1, 2 and 3 together include (0,1], [−1,0), and [1,oo) and (−oo,−1]

Rule 5 says that 0 is neither finite nor infinite.

0 was never included as finite. What five says is that if x is not zero or finite, then it is infinite.

That exhausts all the reals, so there is no x derivable from your rules that satisfies infinite(x).

No finite reals satisfy infinite(x). The inverses of 0 and the infinitesimals (which are not included in these rules so far, since we were talking finite vs. infinite), are infinite.

> Tony Orlow wrote:
>
> > Anything that is not zero or finite is infinite, whether positive or negative.
>
> So where do these "anythings" come from? I don't see anything in your rules that define anything but the finite reals and zero.
>
> From the inverse of 0 and the infinitesimals. Shall I add more axioms?

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Smiles,

Tony
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