Re: infinity

Source: http://sci.tech−archive.net/Archive/sci.math/2005−09/msg01514.html

- *From*: Tony Orlow (aeo6) <aeo6@xxxxxxxxxxx>
- *Date*: Wed, 7 Sep 2005 13:13:40 −0400

imaginatorium@xxxxxxxxxxxxx said:
> aeo6 Tony Orlow wrote:
> > imaginatorium@xxxxxxxxxxxxx said:
> > >
> > > Tony Orlow (aeo6) wrote:
> > > > Except that, as you just pointed out, for any set of consecutive naturals
> > > > starting from 1, the set size IS an element of the set. Therefore, if the set
> > > > is infinite, then it contains an infinite element. This is a contradiction. So
> > > > how do you resolve this?
> > >
> > > Very simply. Extremely simply, though obviously beyond you. We observe
> > > that any element of the set that is equal to the set size must be the
> > > largest element in the set. We deduce that in a set with no largest
> > > element, there is no largest element that could be equal to the set
> > > size.
> > Okay, then what is the size of the set? The proof shows also that the set size
> > IS a member of the set.
>
> I missed this bit of the proof. _How_ does it "prove" that the set size
> IS a member of the set? (Yeah, yeah, I guess because for any finite
> sequence, the maximum member exists and is equal to the set size. In
> the limit, the maximum member doesn't exist, but somehow must be equal
> to the set size, so while nonexistent, must creep back into the set
> disguised as an 'infinite number'. Ho hum.)

Ho hum? The set of naturals is the set of all consecutive finite whole numbers
starting from 1. The proof shows that for any such set, the size of the set is
a member of the set. Do you know what the largest finite natural is? No. Do you
know what the size of the set of finite naturals is? No. But, you know those
two numbers are the same number, so one cannot be finite while the other is
infinite.
>
> Anyway, if you care to show this bit of the proof *carefully*, you
> might like in parallel to provide a proof that sqrt(2) is rational
> (it's the limit of a sequence, every member of which is rational), and
> show the difference − why your "proof" of the set membership of
> something which doesn't on the face of it exist is valid, while the
> squrt(2) proof is (I suppose you might agree?) invalid.
>
> > So, if the set size is infinite, then how can that

> > number NOT be part of the set of whole numbers starting from 1? For any such
> > set, the size IS an element. Do you disagree?
>
> Obviously I disagree. We know that for any not−quite−such set (i.e. any
> *finite* initial segment of the naturals) the largest: (a) exists, (b)
> is a member, and (c) equals the set size.
Right, for all n in N.
> We also can see that for the
> complete set of naturals, this largest (a) does not exist, and
> therefore (b) is not a member, so everyone except you is baffled as to
> how it can (c) equal the set size.
Again, with the "no largest finite" argument. Do you honestly think that you
can just dismiss obvious facts for the entire set because there is no last
element? That is entirely irrelvant. If all elements are finite, then this fact
holds for all elements in the set. To put it another way, for any such set of
size n, n is an element of the set. So, how big is your set of naturals, again?

>
> > > Do tell me:
> > > consider a binary tree in which there are only branching nodes − how
> > > many leaf nodes are there? Use Tinduction, or any other favourite tool.
> > What is the purpose of this question? The obvious answer, using plain logic, is
> > that a tree with no leaf nodes has zero leaf nodes.
>
> Good. Sounds about right.
>
> > However, an infinite binary
> > tree really has infinite numbers of leaf nodes.
>
> Hmm, and this contradiction doesn't bother you much? You don't think
> that if something has zero leaf nodes, it can't really have an infinite
> number of them as well?
It depends how you imagine it. I don't think you can simply pretend there are
definitely no leaf nodes when the tree is infinite. This is just another form
of the "largest finite" mantra.
>
> For level n, starting with zero
> > at the root node, there are 2^n nodes. If a tree is x levels deep, it has 2^x
> > leaf nodes. If x is infinite, then 2^x is infinite as well. By pretending that
> > somehow at x=oo all the leaf nodes disappear is inconsistent.
>
> Of course. No mathematician thinks that "at infinity" anything
> disappears. You are stuck with your maundering finite imponderable
> numbers, which is where you think things "reach infinity".
No, you are stuck in yet another misconception about what I am saying. But, do
go on.....

> Mathematicians, though, say "unending" meaning, er, really, really,
> really, not having an end. No end. Just endless. Not even an end
> labelled "infinity".
And yet, the projectively extended real numbers do have infinity at a point on

the circle, opposite zero, the way the numbers SHOULD be viewed from the
infinite perspective. It is perfectly valid to view infinity as a point
infinitely far from zero.
>
> But of course,
> > you will say that there are infinite levels so we never get any leaf nodes. I
> > am not sure how you reconcile this with the inductive argument that the number
> > of leaf nodes of a tree with n levels is 2^n.
>
> At least you seem to see there is a problem.
I tend to think the problem there comes from pretending the leaf nodes
disappear at infinity. I prefer to say that if there are n branches, there are
n/2 paths and leaf nodes, whether n is finite or infinite. That is more
consistent.
>
> Brian Chandler
> http://imaginatorium.org
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>

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Smiles,

Tony
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- ***Follow-Ups***:
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  - ***Re: infinity***
    - *From:* David Kastrup
- ***References***:
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    - *From:* aeo6
  - ***Re: infinity***
    - *From:* Daryl McCullough
  - ***Re: infinity***
    - *From:* imaginatorium
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