Re: infinity

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- *From*: imaginatorium@xxxxxxxxxxxxx
- *Date*: 6 Sep 2005 13:15:19 −0700

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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.)

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. 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.

> > 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?

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".
Mathematicians, though, say "unending" meaning, er, really, really,
really, not having an end. No end. Just endless. Not even an end
labelled "infinity".

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.

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    - *From:* aeo6

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- ♦ ***Re: infinity***
  - ◊ *From:* imaginatorium
- ♦ ***Re: infinity***
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