Re: The complete infinite binary tree has only countably many infinite paths.

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- *From*: Virgil <Virgil@xxxxxxxxx>
- *Date*: Sun, 29 Mar 2009 17:03:20 −0600

In article <3038c6d1−8c49−4ef1−aeb3−ba18f471cdf9@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx>, WM <mueckenh@xxxxxxxxxxxxxxxxx> wrote:

> On 29 Mrz., 13:55, "Peter Webb" <webbfam...@xxxxxxxxxxxxxxxxxxxxxxxxxx> wrote:
>
> > > Happens every couple of months here. The informational or educational value of such threads is zero for anybody with the slightest knowledge of set theory.
> >
> > You could have learned the following: There is no path 0.111... in the tree, namely a path that is distinct by a certain number (aleph_0) of ones from all paths used to construct the tree. There is only, for every path with n bits of value 1, another path with one more bits of value 1. That is the whole infinite story.
> >
> > But the same holds for Cantor's list. There is no line that shows you that the diagonal number is not in the list. There is only a line that shows you that the diagonal number in not in the first n lines of the list but that does not exclude that it could be in the next line.

> > > Regards, WM

> > I see. You don't agree with Cantor's proof, either, and for the same reason.
> > You could have skipped all this stuff about infinite binary trees.
> >
> > Cantor's diagonal proof shows, if you like, that the number is not in the
> > first n lines for ALL n.

> And we know that a sequence with n digits is finite for ALL n.
> You do not construct an irrational number.

The issue is whether one can always construct a binary sequence not in a
given sequence of binary sequences.
An there is a simple algorithm which shows we can:
For any infinite sequence of sequences of 0's and 1's,
one non−member of that sequence has
1 − (the nth term of the nth sequence)
as its nth term.

> > More specifically, it shows that it is not the nth
> > entry for any n. It cannot appear in the 1st position, or in the 2nd, or in
> > the 3rd position, ... it is missing from the list entirely.

> More specifically, a sequence with n digits is a rational number.

But this is a sequence with aleph_0 digits.

> > If you try and list all the Reals in [0,1], you will see how hard it is even
> > without using Cantor to find a missing Real. Very few constructions even
> > manage to put 1/3 on the list

> I have never seen a construction with infinitely many digits. Either
> you give a brief formula for construction like 1/3 or you give a
> finite sequence. But all these finite definitions form a countable
> set.

Cantor's construction (see above), is a finitely expressed rule for
construction a non−member of ANY list of binary sequences.
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