Re: Cantor and the binary tree

Source: http://sci.tech−archive.net/Archive/sci.math/2005−05/msg04708.html

- *From*: Virgil <ITSnetNOTcom#virgil@xxxxxxxxxxx>
- *Date*: Wed, 25 May 2005 11:12:49 −0600

In article <1117022046.200086.282790@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
mueckenh@xxxxxxxxxxxxxxxxx wrote:

> Dik T. Winter wrote:
> > In article <1116958479.555107.284630@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
> > mueckenh@xxxxxxxxxxxxxxxxx writes:
> > > Dik T. Winter wrote:
> > > > In article <1116939502.814879.192170@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
> > > mueckenh@xxxxxxxxxxxxxxxxx writes:
> > > > > If we accept that, in binary digits, SUM{n = 1 ... oo} 2^−n =
> > > > > 0.111... = 1
> > > >
> > > > You may note that that is *not* an infinite sum...
> > >
> > Note what I said here. It is not a sum of infinitely many terms.
> >
> > > > > .
> > > > > 0 1
> > > > > 0 1 0 1
> > > > > .....
> > >
> > > Any path is an infinite sequence of bits which by multiplying with 2^−n
> > > and summing up establishes an infinite series representing a real
> > > number. Every combination of countably many bits is realized by
> > > definition.
> >
> > Mathematics does *not* define summing up infinitely many terms. It uses
> > limits in this case.
>
> Does mathematics allow me to write
> 0.
> 1
> 1
> 1
> ...
> ?
>
> > > Why should 0.010101... not exist in that tree? Every path is infinite
> > > by definition as is 0.010101..., by definition.

> >
> > The path does exist, but there is no node at the end. Or if you wish
> > there is a node at the and (as J.H. Conway does with his surreal numbers),
> > the number of nodes is uncountable.
>
> There can be no node at the end, because there is no end. We do not
> need any node at the end in order to show that the set of nodes is
> equivalent to that of paths. It is shown by the following steps. Please
> point out which step is wrong.
>
> 1) Each real number of (0,1) is given by a path stretching over
> infinitely many nodes (bits).
> 2) All nodes (bits) of the tree belong to a countable set.
> 3) A node can only exist within a path.
> 4) Any node increases the number of paths by 1 from 1 coming in, to 2
> going out. 2 − 1 = 1.
> 5) Any node increases the number of nodes by 1.
>
> Regards, WM

WM's "proof" disproved"

WM conflates bounded paths, having terminal or leaf nodes with unbounded unending paths which have no terminal or leaf nodes, but contain infinitely many intermediate nodes.

1) Each number of (0,1) is given by an UNENDING path stretching over infinitely many nodes (bits).

2) All nodes (bits) of the tree belong to a countable set.

3) A node can only exist within a path.

4) Any node increases the number of ENDING paths, having terminal or leaf nodes, by 1 from 1 coming in, to 2> going out. 2 − 1 = 1.

5) Any node increases the number of nodes by 1, but have absolutely nothing to do with the number of unending paths.

All unending paths in an unending binary tree contain infinitely many nodes.

The number of leaf nodes exactly equals the number of ending or finite paths in any finite binary tree (in which all paths end).

Considering the binary tree whose root is "." and each branch is indicated by a "0" or a "1", each leaf node, and therefore each path, is represented by a terminating binary fraction , but each unending path is represented by a non−terminating binary fraction.

There are moreof the non−terminating than of the terminating.

So WM is wrong yet again.
.

- ***References***:
  - ♦ ***Cantor and the binary tree***
    - ◊ *From:* mueckenh
  - ♦ ***Re: Cantor and the binary tree***
    - ◊ *From:* Dik T. Winter
  - ♦ ***Re: Cantor and the binary tree***
    - ◊ *From:* mueckenh
  - ♦ ***Re: Cantor and the binary tree***
    - ◊ *From:* Dik T. Winter
  - ♦ ***Re: Cantor and the binary tree***
    - ◊ *From:* mueckenh

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