

Re: Cantor and the binary tree

Source: <http://sci.tech--archive.net/Archive/sci.math/2005-05/msg04662.html>

- *From:* mueckenh@xxxxxxxxxxxxxxxxxxxx
 - *Date:* 25 May 2005 04:12:01 -0700
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Virgil wrote:

> In article <1116939502.814879.192170@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
> mueckenh@xxxxxxxxxxxxxxxxxxxx wrote:
>
>> Cantor and the binary tree.
>>
>> If we accept that, in binary digits, $\text{SUM}\{n = 1 \dots \infty\} 2^{-n} = 0.111\dots$
>> = 1
>>
>> then all the real numbers of the interval [0,1] are realized as
>> infinite paths of the binary tree
>> .
>> 0 1
>> 0 1 0 1
>>
>>
>> too (read from top to bottom). Each number is given by a path
>> stretching over infinitely many nodes (bits). All nodes (bits) of the
>> tree are countable. The paths are not, according to Cantor's famous
>> diagonal proof.
>
> So far so good.

> One does not assume it, one proves it, as I have done several times.
>
> Here is an outline of that proof:
>
> Every node is represented by a terminating binary (starting at "." and
> terminating at the node itself in the tree above) which is like a subset
> of the rationals, which are countable.
>
> Every unending path is represented by a non-terminating binary (also
> starting at "." but never ending), which surject onto the real interval
> [0,1], and are thus as uncountable as the reals.
>
> That WM choses to reject proofs that show him wrong does not invalidate
> such proofs.

Re: Cantor and the binary tree

Cantor's proof is questioned, hence I do not accept it as an argument. Please find out at which step my arguing fails. As you seem to accept the first points, you may start at point 3.

- 1) Each 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

- ***Follow-Ups:***

- ◆ ***Re: Cantor and the binary tree***
◇ *From: Virgil*

- ***References:***

- ◆ ***Cantor and the binary tree***
◇ *From: mueckenh*
- ◆ ***Re: Cantor and the binary tree***
◇ *From: Virgil*

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