Re: Cantor and the binary tree

Source: http://sci.tech−archive.net/Archive/sci.math/2005−05/msg04436.html

- *From*: mueckenh@xxxxxxxxxxxxxxxxx
- *Date*: 24 May 2005 11:14:39 −0700

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...
>
> > .
> > 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.
> ...
> > But we find that, up to line number n, there are −1 + 2^(n+1)
nodes
> > whereas 2^n different paths arrive at and 2^(n+1) different paths
> > spring off from line number n. Hence, in the enumerated domain,
there
> > is at most one more path than nodes. After leaving any finite line
> > number n (if it is reasonable to make such a distinction) we can
no
> > longer apply these formulae. But we know that any new branching
> > increases the number of paths by 1 and, by definition, the number
of
> > nodes by 1 too (because any branching is a node). Therefore, the
number
> > of paths always equals that of the nodes + 1. It is simply
impossible
> > to assume that one of these numbers becomes uncountably infinite
while
> > the other remains countably infinite.
>

> Also we find that up to line n, summing up to that node along the
path
> gives a value for k/(2^n) for some integer k.

It is forbidden to stop there, by definition. If you want to realize a
terminating rational with n bits, then you must follow, from line n+1
on, the path with infinitely many zero−bits.

Therefore a number along
> a node is always equal to a rational with a denominator that is a
power
> of two. It is simply impossible to assume that one of these numbers
> becomes 1/3.

Why should 0.010101... not exist in that tree? Every path is infinite
by definition as is 0.010101..., by definition.

Regards, WM

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- ***Follow−Ups***:
    - ***Re: Cantor and the binary tree***
        - *From:* Dik T. Winter
    - ***Re: Cantor and the binary tree***
        - *From:*