Cantor and the binary tree

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Cantor and the binary tree.

If we accept that, in binary digits, SUM{n = 1 ... oo} 2^−n = 0.111...
= 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.

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.

Regards, WM

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    - *From:* Gottfried Helms

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  - ◊ *From:* Virgil
- ***Re: Cantor and the binary tree***
  - ◊ *From:* Robert Kolker
- ***Re: Cantor and the binary tree***
  - ◊ *From:* David C . Ullrich
- ***Re: Cantor and the binary tree***
  - ◊ *From:* Dik T. Winter

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