

Re: infinity

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- *From:* Virgil <ITSnetNOTcom#virgil@xxxxxxxxxxx>
 - *Date:* Wed, 07 Sep 2005 15:48:50 -0600
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In article <MPG.1d88e60baef09fd398a207@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>, Tony Orlow (aeo6) <aeo6@xxxxxxxxxxx> wrote:

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> imaginatorium@xxxxxxxxxxx said:
>> aeo6 Tony Orlow wrote:
>>> imaginatorium@xxxxxxxxxxx said:
>>>> Tony Orlow (aeo6) wrote:
>>>>> Virgil said:
>>>>>> In article <MPG.1d7f9000c6e111a298a19f@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
>>>>>> Tony Orlow (aeo6) <aeo6@xxxxxxxxxxx> wrote:
>>>>>>> ...[?]
>>>>>>>>> I mapped paths from the same tree ...
>>>>>
>>>>> That's enough. I'm generally avoiding both tree and vase arguments,
>>>>> since they are far too complex. But let's just try a little...
>>>>>
>>>>>> Let us try inductive proofs regarding the relationship between
>>>>>> branches and
>>>>>> paths.
>>>>>
>>>>> Uh-oh. OK, I'll try as well. I'll investigate how many ends there are
>>>>> in an endless tree (that's one in which every node branches into two
>>>>> child nodes, and this never never never never ends). Intuitively, I'd
>>>>> expect that an endless tree would not have any ends, since I've defined
>>>>> it that way, but let's see.
>>>>>
>>>>>> Proof: In a maximal binary tree, number of paths is half the number
>>>>>> of
>>>>>> branches, plus 1.
>>>>>>
>>>>>>> 1. For an empty tree consisting of the root node, there is one path
>>>>>>> in the
>>>>>>> tree, of length zero, and no branches. 1 path = 0 branches/2 + 1.
>>>>>>
>>>>>>> For an "empty" [not quite the right word, is it] tree, there is one
>>>>>>> end.
>>>> Uh, yeah, one path, like I said.
>>
>>> Look, you have written your "proof" - I'm interlining my "proof", a
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>> different "proof", of something different. (What do you mean by "path"?)
>> Is it a 'way through the tree'?)
> Yes a path is a succession of branches from the root, through child nodes, to
> a
> leaf, or possibly infinitely long with no discernible leaf.
>>
>> <snip>
>>
>>>>> Proof: In a maximal binary tree with paths of length n , or depth of
>>>>> n , there
>>>>> are $p(n)=2^n$ paths and $b(n) = 2(2^n-1) = 2(p(n)-1)$ branches.
>>>>
>>>> What do you mean by "Proof"? Isn't this still part of the same
>>>> argument? You would get more respect if you took the trouble to
>>>> understand elementary notational conventions.
>>> This was a second proof, using a slightly different statement.
>>
>> Oh, OK. In a tree that terminates at depth n , $p(n)$ is the number of
>> terminal nodes, and $b(n)$ is the number of 'branches', where a branch is
>> a link from one node to its child. Yeah, OK, I agree with the
>> 'numbers'.
> Yay!!!
>>
>>
>>>> Anyway, never mind: to finish off *my* proof... By induction, the
>>>> number of ends of an endless tree is infinity. Da-dah!!
>>> yes, you are very clever.....
>>
>> Well, I'd like you to address the substantive issue. Seems to me that
>> if one were to consider an unending tree, each path through it would be
>> unending, so there would be some infinite number of branches, but there
>> would also be zero leaf nodes. Do you agree?
> If one imagines a tree that goes forever and never ends, one might imagine
> that
> there are no leaf nodes. If we look at the tree as representing the binary
> numbers, each path corresponds to a single infinite string of bits, each
> branch
> corresponds to a bit, and the nodes are just the spaces between digits. The
> root node corresponds to the digital point. So, no leaf nodes means that all
> bit strings are infinite. I suppose I can live with an image with no leaf
> nodes, but that doesn't affect the relationship between branches and paths,
> does it?

Yes it does! In trees in which every path has a leaf node, there is an obvious bijection between paths and leaf nodes, but in a maximal binary tree there are infinitely many paths and zero leaf nodes. If that correspondence fails so dramatically in the "limiting" case, what is TO's evidence that any others still hold?

- *Follow-Ups:*
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 - ◇ *From: aeo6*

- *References:*
 - ◆ **Re: infinity**
 - ◇ *From: aeo6*
 - ◆ **Re: infinity**
 - ◇ *From: imaginatorium*
 - ◆ **Re: infinity**
 - ◇ *From: aeo6*
 - ◆ **Re: infinity**
 - ◇ *From: imaginatorium*
 - ◆ **Re: infinity**
 - ◇ *From: aeo6*

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