

# Re: Well Ordering the Reals

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*Source:* <http://sci.tech-archive.net/Archive/sci.math/2005-12/msg00337.html>

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- *From:* Tony Orlow <[aeo6@xxxxxxxxxxxx](mailto:aeo6@xxxxxxxxxxxx)>
  - *Date:* Thu, 1 Dec 2005 13:13:39 -0500
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William Hughes said:

>  
> Tony Orlow wrote:  
>> Matt Gutting said:  
>>>> BINGO! The whole question is "what is this additional specification"  
>>>> The places of the bits, either relative or absolute.  
>>>>  
>>>> You're arguing circularly. "The places of the bits, either relative or absolute"  
>>>> must be determined by some indexing set. "The places of the bits" are precisely  
>>>> what determines "whichever is to the left of the other". But that's precisely  
>>>> what we're asking.  
>>>>  
>>>  
>> Okay, sure. I just said this in another post, that as I think about it now, it  
>> seems that the general approach is essentially to define multiple digital  
>> points. With normal finite digital numbers, all significant digits are within a  
>> finite number of steps of THE digital point at bit 0, and that's how we know  
>> their values. I guess what my system really boils down to is defining multiple  
>> digital points, at locations infinitely far apart in the string, with finite  
>> neighborhoods.  
>  
> What is a your definition of a finite neighborhood?  
The set of points within a finite number of bit positions of a "limit" digital point, such as 0 or  $\log_2(N)$ .  
>  
>>When I say 1:000...000 is N, that colon is a digital point at  $\log_2(N)$ .  
>  
> So how far is the last 0 in 1:000...000 from the digital point?  
It's the  $\log_2(N)$ th bit to the left of the root digital point. Of course, it's the first to the right of the  $\log_2(N)$  digital point.  
>  
>  
>>If I say the point is at N, then I have  $2^N$  as a value. If I say the  
>> point is at  $\log_2(N)$ , and have 1:111...111.111...111, I have  $10N/9$ . Like I said  
>  
>  
> In 1:111...111.111...111 Do the ellipses represent finite or infinite  
> gaps?  
Infinite.

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>  
>  
> how far is the forth 1 from the digital point?  
The one before the first ellipses?  $\log_2(N)-3$  to the left.  
> how far is the fifth 1 from the digital point?  
The fifth displayed? It's the third bit, so 3 places  
> how far is the seventh 1 from the digital point?  
1  
> how far is the last 1 from the digital point?  
 $\log_2(N)$  to the right.

I hope I got your questions right, and you were referring to the bits numbered as displayed, not implied in the string.

>  
> -William Hughes  
>  
>

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Smiles,

Tony  
<http://www.people.cornell.edu/pages/aeo6/WellOrder/>

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- *Follow-Ups:*
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◇ From: Virgil
    - ◆ **Re: Well Ordering the Reals**  
◇ From: William Hughes
  - *References:*
    - ◆ **Re: Well Ordering the Reals**  
◇ From: Tony Orlow
    - ◆ **Re: Well Ordering the Reals**  
◇ From: Matt Gutting
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