# Re: abundance of irrationals!)

***Source:*** http://sci.tech−archive.net/Archive/sci.math/2005−05/msg01748.html


- *From*: mueckenh@xxxxxxxxxxxxxxxxx


- *Date*: 10 May 2005 04:47:31 −0700


Randy Poe wrote:
> mueck...@xxxxxxxxxxxxxxxxx wrote:
>
> > Then consider this list 2 please:
> >
> > .
> > 0 1
> > 0 1 0 1
> > 0 1 0 1 0 1 0 1
>
> Does this mean 0.01, 0.0101, 0.01010101, ...?
>
> > and read from top to bottom (like the Chinese do or like we do in
> order
> > to read the diagonal number of a list).
>
> I don't understand what you mean. What is the first number
> in this list? What is the second?

There is every real number of[0,1].
>
> > Then you find ALL the bits of 1/3 = 0.010101... in the positions
> > 1,2,3,6,11,22,...
>
> A number x being in your list means that there is m
> such that the m−th number in your list is x.

No, these numbers exist in the same way as Cantor's antidiaonal. For every digit of number x I can show you the place in my list where it is. The number 0 = 0.000... for instance has always the first digit (0) of each line.

But we need no quarrel about this kind of existence. Imporant is only that the bit−positons of the list are countable, but there are more bit−positions than reals in [0,1] because every real deviates at leat a one position from another real.

> > a_1 = 1 (Position of the first 0 after the point)

> > a_n = 2*a_(n−1), if n is even,
> > a_n = −1 + 2*a_(n−1), if n is odd.
>
> Are you saying that a_n is the value of the n−th digit
> for EVERY number in your list?

This sequence gives the bit positions for 1/3. For other nunmbes there
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