# Re: A tiny Collatz−exercise

***Source:*** http://sci.tech−archive.net/Archive/sci.math/2008−07/msg00051.html

- *From*: Gottfried Helms <helms@xxxxxxxxxxxx>
- *Date*: Tue, 01 Jul 2008 15:03:34 +0200

Am 30.06.2008 22:35 schrieb Mensanator:

> On Jun 29, 12:56 am, Gottfried Helms <he...@xxxxxxxxxxxx> wrote:
>
>> Yes. take n=7, then 3x=21. Now either 22 or 20 has
>> exactly one factor of 2,
>
> I was going to ask why this is so, but then
> I remembered that the even numbers count of
> contiguous LS 0−bits is a 2−adic sequence:
>
> 1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,5,...
>
> so every odd number has one adjacent even
> number with exactly 1 factor of 2.

Yes, this simply, because the sequence of even
numbers

[2,4,6,8,10,12,14,...]
is

2*[1,2,3,4, 5, 6, 7,...]

and so each even number with one factor of 2 are followed
by one even number with more factors of 2.

> Keeping in mind that this is based on statistics,
> which doesn't take certain realities of the Collatz
> graph structure into consideration, which can be
> seen here:
>
> <http://members.aol.com/mensanator666/Page.htm>

thanks, I'll have another look at it...

> In Collatz, only contiguous 1−bits at the LS end
> can create continuous increase. But every number has
> a finite number of contiguous 1−bits, so, sooner or
> later, the Collatz sequence MUST start decreasing
> (unless the propagating carry bits can create a new,
> unbroken string of 1's at the MS end, but that can't
> happen).
>
> The increasing may resume later, but it can never
> increase continuously. This does not say anything
> about the net result of such alternating
> increase/decrease.

Yes, this is the meaning of

2n*2^k − 1 −> 2n*3^k − 1 (k compressed steps)

where 2n*2^k − 1 has k trailing bits

n=1, k=3

7 (= 2*1 *2^2 − 1) −> 17 (= 2*1*3^2 − 1)

and then a decreasing step is required.