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HERMAN P. ROBINSON
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(415) 283-1861

13 October 1975

Dear Neil:

Fred Gruenberger says he has a sequence of 1000 terms provided by some unknown person a few years ago, and the nature of the sequence is unknown to him. He would like it identified. Do you recognize it? The terms he sent me are

3	4	5	7	10	14	20	29	43
64	95	142	212	317	475	712	1067	1600
2399	3598	5396	8093	12139	18208	27311	40966	61448 ....

The ratios of adjacent terms seem to be approaching 3/2, but I can't match the sequence or ones simply derived from it with anything in your book. Whether the term is even or odd seems somewhat random. I couldn't find a simple recurrence for the series or for its first or second differences.

I've asked Fred for some larger terms, mainly to see how close the ratio of terms gets to 3/2. He says the 1000th term has 177 digits, which is consistent with a ratio of 3/2.

Belated birthday greetings to you.

Sincerely,

Herman

Neil:

Your friend's puzzle sequence 3 4 5 7 10 ...

seems to satisfy

$$t_{n+1} = t_n + \left[\tfrac{1}{2}(t_n - 1)\right]$$

Colin

24 x 75

(i.e. t_n even: $t_{n+1} = \frac{1}{2}(3t_n - 2)$

t_n odd: $t_{n+1} = \frac{1}{2}(3t_n - 1)$)

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Bell Laboratories

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November 4, 1975

Mr. H. P. Robinson
31 Diablo Circle
Lafayette, California 94549

Dear Herman:

My colleage C. L. Mallows by a great stroke of genius found a recurrence for Fred Gruenberger's sequence

$$3,4,5,7,10,14,20,29,43,64,95,142,\ldots .$$

It is

$$t_{n+1} = t_n + [\tfrac{1}{2}(t_n - 1)],$$

where [x] denotes the integer part of x. In other words,

$$t_{n+1} = \tfrac{1}{2}(3t_n - 2) \text{ if } t_n \text{ is even,}$$

$$t_{n+1} = \tfrac{1}{2}(3t_n - 1) \text{ if } t_n \text{ is odd.}$$

Best regards,

MH-1216-NJAS=mv

N. J. A. Sloane ← THIS COPY FOR

Copy to
Messrs. C. L. Mallows
Fred Gruenberger