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etc

S. Schreiber
~~Letter to~~ and NJAS,
correspondence

42 pages

Mac & Sloane 2nd edits A6368
A6369
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Bar-Ilan University
Ramat-Gan, Israel
Department of Mathematics
and Computer Science

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Dr Jessie MacWilliams & Dr N J A Sloane
Math Research Centre, Bell Laboratories
600 Mountain Avenue, Murray Hill 07974 NJ.

May 22 1980

Dear Jessie & Neil,

just found your letter of April the 24-th awaiting me at the University; Thank you very much, that was a load off my puny mind. It is still a pity that Problem 17 in your Ch. 2 will look a bit clumsier in the next edition. And, apropos of next editions, is not the sequence at the bottom of your p. 54 (Ch 2, Problem 8)

1, 1, 2, 3, 5, 9, 32, 56, 44 . . . . ✓ done 91 ✓

a respectable Integer Sequence?

R. K. Guy and Hallard Croft plan a book on Problems in Intuitive Mathematics. p. 122 One, [J. H. CONWAY: Unpredictable iterations, Proc. Number Theory Conf. Boulder, Colorado 1972, 49-52] concerns two very "tame" sequences, call them $A(n)$ and $B(n)$, with $A(B(n)) = B(A(n)) = n$;

$(x+3x^2+x^3+3x^4+x^5)/((1-x^2)^2(1+x^2)) \Rightarrow 1, 3, 2, 6, 4, 9, 5, 12, 7, 15, 8, 18, 10, 21, 11 \ldots$ 6368

$(x+3x^2+2x^3+3x^4+x^5)/(1-x^3)^2 \Rightarrow 1, 3, 2, 5, 7, 4, 9, 11, 6, 13, 15, 8, 17, 19, 10, 21, \ldots$ 6369

whose known cycles ($n \to A(n) \to A(A(n)) \to \cdots$) are $\{1\}$, $\{2,3\}$, $\{4,6,9,7,5\}$ and $\{44, 66, 99, 74, 111, 83, 62, 93, 70, 105, 79, 59\}$. Any use?

Many thanks again and all the best

Shmuel Schreiber

Bell Laboratories

600 Mountain Avenue
Murray Hill, New Jersey 07974
Phone (201) 582-3000

June 9, 1980

Dr. Shmuel Schreiber
Department of Mathematics
and Computer Science
Bar-Ilan University
Ramat-Gan
ISRAEL

Dear Shmuel:

Thanks for the sequences. As a matter of fact they have arrived at just the right moment - this summer I am writing a second edition of the Handbook of Integer Sequences. So if you come across any others, please send them too.

All the best,

MH-1216-NJAS-mv

N. J. A. Sloane

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Dr N. J. A. Sloane
Math. Research Centre Bell Laboratories
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U.S.A

25. 6. 1980

Dear Neil,

looking forward to the next edition of your Integer Sequences (I may have to look for it at Tel-Aviv U. since Bar-Ilan are either too poor or too stingy to buy even the second half of Error Correcting Codes, - had to borrow this from Tel Aviv as well). —

In the few pages of offprint Guy has sent me, I have (naturally) met

$$4t + t^2 + 10t^3 + 2t^4 + 16t^5 + 3t^6 + \cdots = \frac{4t + t^2 + 2t^3}{(1-t^2)^2}$$

6370

whose iterations form the well known Syracuse Problem. - Guy & Croft may have some more (they certainly exhibit your sequence 566: 1, 2, 5, 13, 29, 34 ... in an interesting form).

— The English edition of Comtet (Reidel; Dordrecht & Boston 1974) contains some more sequences. For example

α) $\sum_{n \geq 0} A(n) t^n / n! = (1 - \frac{t}{1!})^{-1} \cdot (1 - \frac{t^2}{2!})^{-1} \cdot (1 - \frac{t^3}{3!})^{-1} \cdots$ (sums of multinomial coefficients), with

n	1	2	3	4	5	6	...
$A(n)$	1	3	10	47	246	1602	

(p. 126) 5651

β) Number of different Partial Derivative monomials in $y_n = \varphi^{(n)}(x)$ if $f(x, y) = 0$, $a(n)$ being the coefficient of $t^n u^{n-1}$ in $\prod'_{i,j \geq 0} (1 - t^i u^j)^{-1}$, where $(i, j) \neq (0,0), (0,1)$.

n	1	2	3	4	5	6	7	8	...
$a(n)$	1	3	9	24	61	145	333	732	

(p. 175).

Before I forget, might'nt you mention in the description of sequence 132: 1, 2, 2, 6, 6, 18 ... that it also counts primitive polynomials over GF(2)? —

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From arithmetic, one might mention the successive length of the Farey sequences

$1, 2, 3, 5, 7, 11, 13, 19, 23, 29, 33, 43, 47, 59, 65,$

$l(n) = 1 + \sum_{K=1}^{n} \varphi(K)$, where φ is Euler's totient (Niven & Zuckerman, Ch. 6).

5728

Next, a pretty ill-behaved sequence:

$1, 2, 1, 2, 4, 2, 1, 2, 2, 5, 4, 2, 1, 2, 6 \ldots$

giving the period length of expanding $\sqrt{D}$ for successive non-square D into a continued fraction (Davenport, Higher Arithmetic, Ch IV §10)

From the same source (Ch VI §5), although he might have copied it from Dickson), one has a sequence beginning with too many 1's, but improving as it goes:

D=	3	4	7	8	11	12	15	16	19	20	23	24	27	28	31	32	35	36	39	40	...
f=	1	1	1	1	1	2	2	2	1	2	3	2	2	2	3	3	2	3	4	2	----

~~63~~71

591

where $D \equiv 0$ or $3 \pmod 4$ and f counts the reduced binary quadratic forms of discriminant $-D$.

Lib / office

Kogbetliantz and Krikorian: Handbook of Complex Prime Numbers (2 Vols., Gordon & Breach 1971) represent primes $4N+1 = a^2+b^2$ always with a odd and b even. Thus, beside your sequences 169 and 33, one might possibly consider

$1, 1, 3, 1, 5, 1, 5, 7, 5, 3, 5, 9 \ldots$
$1, 2, 2, 4, 2, 6, 4, 2, 6, 8, 8, 4 \ldots$

not yet entered

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~~6373~~

have

All the best, and my respects to the Lady called Jessie

Shmuel.