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Hodgson

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28 October 1991

Dr N.J.A. Sloane
Room 2C-376
AT&T Bell Laboratories
Murray Hill, NJ 07974
USA

Dear Dr Sloane,

Following a request which you made in the July-August issue of the *Notices of the American Mathematical Society* (p. 542), please find enclosed a copy of a paper entitled "On some number sequences related to the parity of binomial coefficients" which is to appear in the February 1992 issue of *The Fibonacci Quaterly*.

The following sequence of numbers is presented on p. 39:

(1) 1, 1, 3, 2, 7, 5, 13, 8, 29, 21, 55, 34, 115, 81, 209, 128, 465, 337, 883, ... A6921

This sequence arises from some work I have done in Pascal's triangle mod 2 (my original purpose was to find "efficient" encodings of binomial coeeficients mod 2, in connection with the "masking" relation introduced by Jones & Matijasevic to arithmetize the work of a Turing Machine – see reference in my paper). As a first step, I considered the sequence obtained by interpreting each row of Pascal's triangle mod 2 as the base-two representation of a number. This leads to the sequence

(2) 1, 3, 5, 15, 17, 51, 85, 255, 257, 771, 1285, ... A1317

I was extremely happy at this stage to find (2) in your book (sequence # 988). This is how I learned about H.W. Gould's paper in which this sequence is introduced.

Sequence (1) above is obtained by considering the sequence of digits along the "Fibonacci diagonals", in Pascal's triangle mod 2, as the base-two representations of numbers. I present in my paper some calculation rules for (1) – see Section 5 and Proposition 6.1 – as well as some nice properties of this sequence – see Propositions 6.2, 6.3.

One could also consider the following two sequences, obtained as subsequences of (1) by taking terms of even (resp. odd) ranks:

(3) 1, 3, 7, 13, 29, 55, 115, 209, 465, 883, ...

(4) 1, 2, 5, 8, 21, 34, 81, 128, 337, 546, ...

I hope this information will be of some interest to you.

Sincerely,

BR Hodgson

Bernard R. Hodgson