5707
etc

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Guy letter

3 pages

Many scaps

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Associate Editor

Unsolved Problems

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88-01-22

→ 5707-5711
-3520
-3269

Dr. Neil J.A. Sloane,
AT & T Bell Laboratories, Room 2C-376,
600 Mountain Avenue,
MURRAY HILL, NJ 07974

Dear Neil,

I learned from Marg Saul (I think it was, chair of the climbing committee of the Calgary Section of the Alpine Club of Canada) that you were climbing with her in Josua Tree. She enjoyed it very much. I would enclose a leaflet about the main club's General Mountaineering Camp (Louise is chair of the camps committee) at Mt. Robson, last week of July & first 2 of August, but it's already fully booked!! hk

I write now to enclose a preview of a next June problem from the *Monthly*, which Bateman has sent me (discretion should be used in further distribution), since it involves sequences not all in Sloane.

$f(n)$ k=1: 1 1 2 2 3 4 4 4 5 6 7 7 8 8 8 8 9 10 11 12 12 13 14 14 15 15 15 16 16 16 16 16 17 18 19 20 21 21 22 23 24 24 25 26 26 27 27 27 28 29 29 30 — 4001

k=2: 1 1 1 2 2 3 3 3 4 5 5 5 5 6 7 7 8 8 8 8 8 9 10 11 11 12 12 12 13 13 13 13 13 13 14 15 16 16 17 18 18 19 19 19 20 20 20 20 21 21 21 21 21 21 21 22 — 5350

→ 5707 k=3: 1 1 1 1 2 2 3 3 3 4 4 4 4 5 6 6 6 6 6 7 8 8 9 9 9 9 9 9 10 11 11 12 12 12 13 13 13 13 13 13 13 14 15 16 16 17 17 17 18 18 18 18 19 19 19 — new

F_m for k=1,2,3 is Sloane 432, 256, 207, but, thereafter:

k=4: 1 1 1 1 2 3 4 5 7 10 14 19 26 36 50 69 95 131 181 250 345 476 657 907 1252 1728 2385 3292 4544 6272 8657 — 3269

$a_n = a_{n-1} + a_{n-5}$ k=5: 1 1 1 1 1 2 3 4 5 6 8 11 15 20 26 34 45 60 80 106 140 185 245 325 431 571 756 1001 1326 1757 2328 3084 4085 5411 — 3520

$a_n = a_{n-1} + a_{n-6}$ k=6: 1 1 1 1 1 1 2 3 4 5 6 7 9 12 16 21 27 34 43 55 71 92 119 153 196 251 322 414 533 686 882 1133 1455 1869 2402 3088 3970 5103 — 5708

5709

k=7: 1 1 1 1 1 1 1 2 3 4 5 6 7 8 10 13 17 22 28 35 43 53 66 83 105
133 168 213 266 332 415 520 653 821 1034 1300 1632 2047 2567 3220 4041

5710

k=8: 1 1 1 1 1 1 1 1 2 3 4 5 6 7 8 9 11 14 18 23 29 36 44 53 64 78 96 119
148 184 228 281 345 423 519 638 786 970 1198 1479 1824 2247 2766 3404

k=9: 1 1 1 1 1 1 1 1 1 2 3 4 5 6 7 8 9 10 12 15 19 24 30 37 45 54 64 76 91
110 134 164 201 246 300 364 440 531 641 775 939 1140 1386 1686 2050 5711
2490 3021

These are fairly closely related to the sequences in the enclosed offprint, which I've sent you earlier.

If you see Conway, remind him to make what corrections he wants to the chapter on Combin. Games in the Graham,Grötschel, Lovasz Handbook, or forever hold his peace (I hope I've spelt that right). Also remind him (as Jerry Lyons probably did recently) that we *should* be writing the Book of Numbers.

Best wishes,

Yours sincerely,

Richard.

RKG:l

Richard K. Guy.

encl: problem
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To appear in the Monthly June 1988

AMM Elem Prob 86-1154 ~~E3271~~

will be changed.

~~E3271~~

Proposed by David Newman, Beer Sheva, Israel.

Fix a positive integer k. Define $f(n)$ on positive integers by $f(n)=1$ for $n \le k+1$ and $f(n)=f(f(n-1))+f(n-f(n-1))$ for $n>k+1$. Define the sequence F_m by $F_m=1$ for $m \le k$ and $F_m=F_{m-1}+F_{m-k}$ for $m>k$. (Note that the F_m are powers of 2 when $k=1$ and ordinary Fibonacci numbers when $k=2$.)

(a) Prove that $f(n)-f(n-1)$ is 0 or 1 for all n, and that $f(n)$ is unbounded.

(b) Prove that $f(F_{m+k})=F_m$ for $m \ge 1$.

AMM 95 555 (E3276) 88.

$f(n) = f(f(n-1)) + f(n-f(n-1))$