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October 26, 1991

Dr. N.J.A. Sloane
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Dear Dr. Sloane:

I am responding to the request for "new sequences, extensions, and corrections" for a second edition of your remarkable volume *A Handbook of Integer Sequences*. I have your Supplement I but I do not know if there are others. I have put all references to sequence numbers in boldface.

The sequence numbers are the N-numbers, of course, as in the 1973 H'book
NJAS

New sequences:

344.5 1, 2, 3, 12, 20, 60, 210, 840, 2520, 2520, ...
LCM of 1 to n

418.3 1, 2, 4, 8, 14, 22, ...
Regions determined by n circles Mathematics Teacher Jan '77

678.5 1, 2, 6, 42, 1806, ... A7018
$a_n = a_{n-1}^2 + a_{n-1}$

1102.4 1, 3, 8, 22, 64, 196, ...
Sum of first n Catalan numbers

1267.5 1, 3, 30, 630, ... A7019
$(2n-1)!/2^{n-1}$

1866.5 1, 7, 36, 165, ...
$(2n+3)C(n-1)$

Extensions:

In general, I found it useful to have explicit or recursive formulas for sequences when they are known. In my own copy, I have such formulas by the following sequences (these are, as you know, a very small percentage of the sequences for which such formulas are possible):

103 $a_{n+1} = a_n + a_{n-1} - 1$

297 $a_{n+1} = \text{Sum } (a_k \text{ to } a_n)$, where $k = n - [\frac{n+3}{2}]$.

585 $a_{n+1} = \text{Sum}(0 \text{ to } k)C(n,k)a_k$. **755** is quite similar to this one.

1793 $(2n)!/2^n$

New references

1760 Two Year College Mathematics Journal Nov 83, p. 407.

Errors:

560 9th term should be 4271. ?

561 9th term is 4466 in an article in the Mathematics Teacher from May 1985. ?
966 formula needs greatest integer function
1375 Easier to put in 3**N than to have the three dots.

Comments:
It is nice to know when sequences are related in a simple way. Here are some examples:
391 is **1022** (triangular numbers) plus one. **522** is **1022** less one.
468 has an interesting pattern: $1^2, 2, 2^2, 2 \cdot 5, 5^2, 5 \cdot 14, 14^2, 14 \cdot 41, 41^2$. This would seem easy to continue, as the numbers 1, 2, 5, 14, 41, are the sums of powers of 3.
1130 is differences of consecutive terms of **577** (Catalan numbers).
1421 is C(2n,n–1).
1574 and **1714** are related by sums and differences.
1630 is every second term of **552**.
1705 is every second triangular number, and the differences of consecutive terms of **1839**.
1709 is the differences of consecutive terms of **1845**; or one could say **1845** is the sum of the first n terms of **1709**.
1719, **1847**, and **1911** are similarly related by sums and differences.
1725 and **1851** are related by sums and differences.
(I have others of these, but it seems a computer search could be done to be exhaustive in the given list.)
1746 could be divided by 6.
It seems that **1835** could be divided by 7.
1997 is the square of corresponding terms of **1217**.
2291 is the square of **1760**.

I hope all this is useful to you.

Sincerely,

Zalman Usiskin

Zalman Usiskin
Professor of Education