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        A515

R K Guy
letter
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86-09-12

Neil J.A. Sloane,
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Dear Neil,

Yet another sequence!

A colleague gave me an elementary exercise from the
text for a course he's giving:

Show that the matrix whose (i,j)th element is $1/(i + j - 1)$ is invertible
and that its inverse has all integer entries. We can't do the exercise,
but the determinant of the inverse for order $n = 1,2,3,\ldots$ appear to be
1, 12, 12 × 180,......., 1 × 12 × 180 × 2800 × 44100 × 698544 × ...
where the factors are 1×1^2, 3×2^2, 5×6^2, 7×20^2, 11×252^2, ...
where 1, 2, 6, 20, 70, 252,... *is* in Sloane (643, central binomial
coefficients). On glancing again I see that 1, 12, 180, 2800,... is also A515
there (2087, remainder in Gaussian quadrature, MTAC 1 (1943) 53). However,
the products

          1, 12, 2160, 6048000, 266716800000, ...

are not!

Who cares?

Richard

RKG:jw

Richard K. Guy.

It's the Hilbert matrix. See first article in May 1983
Monthly.

R.