63.35 The twenty-fifth (known) perfect number

The discovery of the 25th Mersenne prime by L. Nickel and C. Noll now means that the number $2^{21700}(2^{21701}-1)$ may be shown to be perfect. Indeed, all that is required to verify that this is perfect—that is, equal to the sum of its divisors

$$1, 2, 2^2, \ldots, 2^{21700}, p, 2p, 2^2 p, \ldots, 2^{21699} p \quad (\text{where } p = 2^{21701} - 1)$$

—is the ability to sum geometric progressions. Also, by recalling that all even perfect numbers are of the form $2^{n-1}(2^n - 1)$, where $2^n - 1$ is prime (the proof of this result being a worthwhile exercise for any young mathematician) and that no odd perfect number has yet been discovered it thus follows that $2^{21700}(2^{21701} - 1)$ is the 25th known perfect number.

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Editorial note. The Editor is grateful to the 10 readers who wrote to draw his attention to the following extract from the *Times* for 17 November 1978: "Two 18-year-old American students have discovered with the help of a computer at California State University the biggest known prime number, the number two to the 21,701st power." (A correction was published in a later issue.) D.A.Q.

Correspondence

The circle and the golden pyramid

DEAR EDITOR,

Re: "An approximate relation between π and the golden ratio" by J. M. H. Peters in the October *Gazette*, pp. 197–198. A better relation is $\pi \approx 6\tau^2/5$, giving $3{\cdot}141\,592\,654 \approx 3{\cdot}141\,640\,787$, with an accuracy of about 15 parts per million. This approximation occurs in a work on the Great Pyramid with no justification whatsoever. Perhaps the author simply discovered it numerically.

Yours sincerely,

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Don't contradict the professor

"SIR—Prof. J. C. Higgins is sadly in error in stating the odds beaten by the Australian cricket captain in winning 8 tosses out of 9.

There are only 10 possible results from 9 tosses—lose all and win any number from 1 to 9. The odds are 9:1.

Odds of 511:1 apply to the number of *sequences* of wins or losses achievable from 9 tosses."

From a letter to the *Daily Telegraph*, 24 February 1979 (per Frank Budden).

https://doi.org/10.2307/3618048 Published online by Cambridge University Press