Correspondence

Reflections on a Presidential Address

DEAR EDITOR

In *Gazette* no. 421, the truth within Professor Matthews' Presidential Address was well illustrated by the articles which followed. To give credit to him, and to yourself, I think that this should be made more explicit.

It will not surprise some readers if I reward Mr. Gates by referring to his article about playing cards. This contains the apparently "unimportant" Gates' Theorems on periods and cycles in packs. When Mr Gates was younger, he sometimes had nothing better to do than play his own invented game of patience ("It is forbidden not to waste time"). "Restlessness" and the "Modified Banana Model" have been applied.

The unimportance has now become important. There is little doubt that he has benefited personally, and will encourage his students in Gillingham to be "mathematically alive" in a similar way.

Yours sincerely,

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DEAR EDITOR,

It is well known that the four-colour problem was suggested to Augustus De Morgan by one of his pupils and that he did his best to publicise it. In looking through his manuscripts in Trinity College Library lately I came upon a letter to R. L. Ellis, dated June 24, 1854, in which he tentatively suggested a proof. It seems also that he had ideas on summation of non-convergent alternating series; in *Trans. Camb. Phil. Soc.* **8**, 182–203 (1849) there is a long discussion of Divergent Series and on p. 192 he has what he describes as a "glimpse" of a method of dealing with such series as

$$1 - 1 + 1 - 1 + \ldots.$$

This is to take the mean of the first n partial sums and to make $n \to \infty$. He shows this to be the limiting case of

$$1 - a + a^2 - a^3 + \ldots$$

provided that 1 is approached by values of a less than 1. This was some 40 years before Cesàro's paper on Multiplication of Series in *Bull. des Sciences Math.* **14**, 114–120 (1890). In referring to this paper I came across another counter-example to the President's (non-) theorem (October 1978 *Gazette*, p. 146). If

$$u_n = \frac{(-1)^{n+1}}{n}, \quad v_n = \frac{(-1)^{n+1}}{\log (n+1)}$$

then, writing

$$w_n = (-1)^{n+1}\left[\frac{1}{\log (n+1)} + \frac{1}{2\log n} + \ldots + \frac{1}{n\log 2}\right]$$