

Michael Nyblom

Deleting Terms of the Divergent p -Series and Reciprocals of Primes Series Using the Thue-Morse Sequence,

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Abstract

By replacing the numerator in the n th term of the divergent p -series and the reciprocals of primes series with the n th term of the Thue-Morse sequence, one can produce a deletion of terms in the said series, which we show remains divergent. A connection is also revealed, between the sequence $(a_n)_{n \geq 1}$ defined as the largest power of two to divide an integer n and the ordinary generating function for the Thue-Morse sequence. In addition, we provide a new elementary proof that the sequence $(a_n)_{n \geq 1}$ is square free in the context of combinatorics on words.