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English summaries

Lluís Bibiloni, Pelegrí Viader, Jaume Paradís

On a series of Goldbach and Euler

Theorem 1 of Euler's paper of 1737 «Variae observationes circa series unfinitas», states the astonishing result that the series of all unit fractions whose denominators are perfect powers of integers minus unity has sum 1. Euler attributes the theorem to Goldbach. The proof is one of those examples of misuse of divergent series to obtain correct results so frequent during the seventeenth and eighteenth centuries. We examine this proof closely and, with the help of some insight provided by a modern (and completely different) proof of the Goldbach-Euler Theorem, we present a rational reconstruction in terms which could be considered rigorous by modern *weierstrassian* standards. At the same time, with a few ideas borrowed from nonstandard analysis we see how the same reconstruction can be also be considered rigorous by modern *robinsonian* standards. This last approach, though, is completely in tune with Goldbach and Euler's proof. We hope to convince the reader then how a few simple ideas from nonstandard analysis vindicate Euler's work.

Keywords: history of mathematics, infinite series, nonstandard analysis.

MSC2000 Subject Classification: 01A50; 26E35.

Enric Fossas Colet

Leonhard Euler: four chosen topics

On the occasion of the 300th anniversary of Leonhard Euler's birth this paper presents four topics from his work: the logarithms, Euler's formula, the Basel problem and masting of ships. The choice of the topics aims to give a plain illustration of part of Euler's work and to include a topic on applied mathematics.

Keywords: Leonhard Euler.

MSC2000 Subject Classification: 01A50.

Joaquim Ortega-Cerdà, Joan Carles Tatjer

Carleson, Abel Prize 2006

In this note, we present three of the most relevant works of Lennart Carleson. He has been awarded the Abel Prize in 2006 and these particular works were mentioned by the prize committee.

Keywords: Fourier series, corona theorem, strange attractors.

MSC2000 Subject Classification: 01A70, 30-03, 37-03, 42-03.

Joan Porti

Hamilton-Ricci flow on three dimensional manifolds

Here we explain the work of Perelman, who solved Thurston's conjecture, and in particular Poincaré conjecture, by using the Ricci flow introduced by Hamilton.

Keywords: Ricci flow, three dimensional manifolds.

MSC2000 Subject Classification: 53.

Jordi Quer

Riemann's zeta funtion

In November 1859 Riemann sent a six pages manuscript to the Berlin Academy entitled «On the number of primes less than a given magnitude», which is his the only publication devoted to Number Theory in all of his scientific production. This work, one of the masterpieces in the whole history of mathematics, pioneered the application of analytic techniques in the study of arithmetic problems. In this work Riemann introduces his well-known θ-function and provides several of its properties from which he derives results on the accumulation of prime numbers. He also states the famous conjecture on the zeroes of the θ function which has become known as the Riemann Hypothesis. After resisting the attempts of many of the best mathematicians, the Riemann Hypothesis is considered one of the most important open problems in mathematics nowadays.

The purpose of these notes is to explain the contents of this work and the fundamental role it has played in the study of the distribution of the prime numbers.

Keywords: Bernhard Riemann, Riemann θ-function, distribution of primes.

MSC2000 Subject Classification: 01A55, 11M06.