37: No 5 September / Septembre 2011

Published by:

Canadian Mathematical Society
Société mathématique du Canada
209 - 1725 St. Laurent Blvd.
Ottawa, ON K1G 3V4, Canada
Fax/Téléc. : 613 733 8994

SYNOPSIS

303 Unsolved Crux Problems: 342 and 1754

Two unsolved problems from *Crux* are reproduced.

304 Recurring Crux Configurations: *J. Chris Fisher*

This new, occasionally appearing column, highlights situations that reappear in *Crux* problems. In this issue problem editor J. Chris Fisher examines triangles for which $2b^2 = c^2 + a^2$. Enjoy!

308 Summations according to Gauss
by *Gerhard J. Woeginger*

The paper begins with a well known anecdote involving C. F. Gauss, as a young child, summing the integers 1 through 100. The author illustrates how a method that could be employed with Gauss' problem can be used to determine various sums and integrals. The method is used on several problems, including one from the 2000 APMO and one from the 1980 Putnam Competition.

312 A nest of Euler Inequalities
by *Luo Qi*

For any given $\triangle ABC$, the *antipodal triangle* is defined. Repeating this construction gives a sequence of triangles with circumradii R_n and inradii r_n obeying a generalized form of Euler's inequality

$$2^n R_n \geq \cdots \geq 2^2 R_2 \geq 2R_1 \geq R_0 \geq 2r_0 \geq 2^2 r_1 \geq \cdots \geq 2^{n+1} r_n,$$

$(n = 1, 2, \cdots)$, with equalities iff $\triangle ABC$ is equilateral.

318 Problems: 3650–3663

This month's "free sample" is:

3658. *Proposed by Ovidiu Furdui, Campia Turzii, Cluj, Romania.*

Let $-\pi < \theta_0 < \theta_1 < \cdots < \theta_k < \pi$ and let a_j, $j = 0, 1, \cdots, k$, be complex numbers. Prove that if

$$\lim_{n\to\infty} \sum_{j=0}^{k} a_j \cos(\theta_j n) = 0\,,$$

then $a_j = 0$ for all j.

3658. *Proposé par Ovidiu Furdui, Campia Turzii, Cluj, Roumanie.*

Soit $-\pi < \theta_0 < \theta_1 < \cdots < \theta_k < \pi$ et soit a_j, $j = 0, 1, \cdots, k$, k nombres complexes. Montrer que si

$$\lim_{n\to\infty} \sum_{j=0}^{k} a_j \cos(\theta_j n) = 0\,,$$

alors $a_j = 0$ pour tout les j.

 Solutions: 3224, 3551–3555, 3557–3562