
PROBLEMS

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PROPOSALS

To be considered for publication, solutions should be received by November 1, 2015.

1971. *Proposed by George Apostolopoulos, Messolonghi, Greece.*

Find all pairs of integers (x, y) such that

$$x^8 + (y^2 + y - 1)(4 - 3x^4) = 2.$$

1972. *Proposed by Marcel Chirita, Bucharest, Romania.*

Let $n \geq 2$ be an integer. Determine all the continuous functions $f : [1, \infty) \rightarrow \mathbb{R}$ such that

$$\int_x^{x^n} f(t)dt = \int_1^x (t^{n-1} + t^{n-2} + \cdots + t) f(t)dt$$

for every $x \in [1, \infty)$.

1973. *Proposed by Arkady Alt, San Jose, CA.*

Let $\Delta(x, y, z) = 2(xy + yz + xz) - (x^2 + y^2 + z^2)$. Prove that for any positive real numbers a, b , and c , the following inequality holds:

$$(\Delta(a^2, b^2, c^2))^2 \geq \Delta(a, b, c) \cdot \Delta(a^3, b^3, c^3).$$

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We invite readers to submit problems believed to be new and appealing to students and teachers of advanced undergraduate mathematics. Proposals must, in general, be accompanied by solutions and by any bibliographical information that will assist the editors and referees. A problem submitted as a Quickie should have an unexpected, succinct solution. Submitted problems should not be under consideration for publication elsewhere.

Solutions should be written in a style appropriate for this MAGAZINE.

Solutions and new proposals should be mailed to Bernardo M. Ábrego, Problems Editor, Department of Mathematics, California State University, Northridge, 18111 Nordhoff St, Northridge, CA 91330-8313, or mailed electronically (ideally as a L^AT_EX or pdf file) to mathmagproblems@csun.edu. All communications, written or electronic, should include **on each page** the reader's name, full address, and an e-mail address and/or FAX number.