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SYNOPSIS

481 The Academy Corner: No. 45 *Bruce Shawyer*

Featuring the hints and answers to the The Bernoulli Trials 2001.

484 The Olympiad Corner: No. 218 *R. E. Woodrow*

Featuring a contest from France, from the “Concours Général des lycées” and the Composition de Mathématiques (Classe terminale S) 1999; the problems of the three rounds of the Iranian Mathematical Olympiad 1998-1999; the problems of the 1999 Chinese Mathematical Olympiad; readers' solutions to problems of the South African Mathematics Olympiad, Section B, September 1995; readers' solutions to problems of the Taiwan Mathematical Olympiad 1996; and readers' solutions to problems of the Croatian National Mathematics Competition, IV Class.

507 Book Reviews *Alan Law*

Mathematical Puzzle Tales

by Martin Gardner

Reviewed by *Edward J. Barbeau*, University of Toronto, Toronto, Ontario.

Machine Proofs in Geometry. Automated Production of Readable Proofs for Geometry Theorems

by Shang-Ching Chou, Xiao-Shan Gao and Jing-Zhong Zhang

Revised by *Maria Hernandez Cifre*, Universidad de Murcia, Spain.

509 Farewell to Alan Law

509 Welcome to John Grant McLoughlin

510 Summation of Finite Series of Integers

C.-S. Lin

If someone asks me how to verify the equality

$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6},$$

immediately I would say it is easy by the Principle of Mathematical Induction, and that is true. If I am further asked how to get the equality in the first place, I would be probably hesitant for a while and I might fail to answer, unless I already knew a method. In fact, some strikingly original algebraic proofs are due to Archimedes and Fibonacci [D.M. Burton, *The History of Mathematics*, 2nd Edition, Wm.C. Brown Publishers, 1991, p. 104 and 102]. In numerical analysis we use factorial polynomials and the telescoping method [F. Scheid, *Numerical Analysis*, Schaum's Outline Series, McGraw-Hill Book Company, 1968, Chap. 17], and a graphical expression (not a proof, though) can be found in [R.B. Nelsen, *Proofs without Words*, Mathematical Association of America, 1993, p. 77]. Mathematical induction is a great common tool used for checking an equality like the one above. But it is imperfect in the sense that we have to know the equality in question beforehand. In this article, motivated by the method of proof of the equality above due to Chorlton [Math. Gazette, 71 (1987), 305–307, p. 305], we shall use finite sums of sine and cosine functions to produce several types of formulas involving summations of finite series of integers by way of differentiation. The next result is our basic tool.

Read on!

514 A Couple of Pretty Mean Questions

Clifford Wagner

The general public uses the word average for a concept that mathematicians prefer to call the arithmetic mean. Fortunately, mathematicians bring more than jargon to a discussion of averages. This note discusses two questions about arithmetic means. See how well you can answer them before reading the hints and answers.

Read on!

516 The Skoliad Corner: No. 58 *Shawn Godin*

Featuring the problems of the 2001 Concours De Mathématiques Du Nouveau-Brunswick; and the problems of the 2001 Maritime Mathematics Contest.

522 Mathematical Mayhem

522 Editorial *Shawn Godin*

523 Mayhem Problems: M22–M28

525 Problem of the Month *Jimmy Chui*

527 Polya's Paragon *Shawn Godin*

529 Symmetric Polynomial Identities *Naoki Sato*

Consider the following problem:

Let a , b , and c be non-negative reals such that $a + b + c = 1$. Show that $ab + ac + bc \leq 1/3$.

In this inequality problem, the variables satisfy a given constraint (their sum must be 1), and the expression in the inequality is a symmetric polynomial in those variables. In this article, we discuss a method of analyzing and proving certain inequalities of this type.

Read on!

534 Problems:

This month's "free sample" is:

2694. *Proposed by Aaron Lee and Jason Wilson, students, Biola University, La Mirada, CA, USA.*

Given a line segment AB , construct a square $ABCD$ using four or fewer circular arcs and a straightedge. The construction should use fewer arcs than those usually given in texts.

537 Solutions: 2577–2581, 2583–2600

565 YEAR END FINALE

565 Thank You

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567 Miscellaneous

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