

Problems

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This section of the Journal offers readers an opportunity to exchange interesting mathematical problems and solutions. Please send them to Ted Eisenberg, Department of Mathematics, Ben-Gurion University, Beer-Sheva, Israel or fax to: 972-86-477-648. Questions concerning proposals and/or solutions can be sent e-mail to <eisenbt@013.net>. Solutions to previously stated problems can be seen at <<http://www.ssma.org/publications>>.

*Solutions to the problems stated in this issue should be posted before
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- **5325:** *Proposed by Kenneth Korbin, New York, NY*

Given the sequence $x = (1, 7, 41, 239, 1393, 8119, \dots)$, with $x_n = 6x_{n-1} - x_{n-2}$.

Let $y = \frac{x_{2n} + x_{2n-1}}{x_n}$. Find an explicit formula for y expressed in terms of n .

- **5326:** *Proposed by Armend Sh. Shabani, University of Prishtina, Republic of Kosova*

Find all positive integer solutions to $m! + 2^{4k-1} = l^2$.

- **5327:** *Proposed by D.M. Bătinetu-Giurgiu, "Matei Basarab" National College, Bucharest, Romania and Neculai Stanciu, "George Emil Palade" School, Buzău, Romania*

Show that in any triangle ABC , with the usual notations, that

$$\left(\frac{ab}{a+b}\right)^2 + \left(\frac{bc}{b+c}\right)^2 + \left(\frac{ca}{c+a}\right)^2 \geq 9r^2.$$

- **5328:** *Proposed by José Luis Díaz-Barrero, Barcelona Tech, Barcelona, Spain*

Without the aid of a computer, find the positive solutions of the equation

$$2^{x+1} \left(1 - \sqrt{1 + x^2 + 2^x}\right) = (x^2 + 2^x) \left(1 - \sqrt{1 + 2^{x+1}}\right).$$

- **5329:** *Proposed by Arkady Alt, San Jose, CA*

Find the smallest value of $\frac{x^3}{x^2 + y^2} + \frac{y^3}{y^2 + z^2} + \frac{z^3}{z^2 + x^2}$ where real $x, y, z > 0$ and $xy + yz + zx = 1$.

- **5330:** *Proposed by Ovidiu Furdui, Technical University of Cluj-Napoca, Cluj-Napoca, Romania*

Let $B(x) = \begin{pmatrix} x & 1 \\ 1 & x \end{pmatrix}$ and let $n \geq 2$ be an integer.