Problems Ted Eisenberg, Section Editor

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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 February 15, 2014

- **5277:** *Proposed by Kenneth Korbin, New York, NY*

  Find x and y if a triangle with sides $(2013, 2013, x)$ has the same area and the same perimeter as a triangle with sides $(2015, 2015, y)$.

- **5278:** *Proposed by Tom Moore, Bridgewater State University, Bridgewater, MA*

  The triangular numbers $6 = (2)(3)$ and $10 = (2)(5)$ are each twice a prime number. Find all triangular numbers that are twice a prime.

- **5279:** *Proposed by D.M. Bătinetu–Giurgiu, "Matei Basarab" National College, Bucharest, Romania and Neculai Stanciu, "Geroge Emil Palade" General School, Buzu, Romania*

  Let $f : \Re_+ \longrightarrow \Re_+$ be a convex function on $\Re_+$, where $\Re_+$ stands for the positive real numbers. Prove that

  $$3\left(f^2(x) + f^2(y)_+ f^2(z)\right) - 9f^2\left(\frac{x+y+z}{3}\right) \geq \left(f(x) - f(y)\right)^2 + \left(f(y) - f(z)\right)^2 + \left(f(z) - f(x)\right)^2.$$

- **5280:** *Proposed by José Luis Díaz-Barrero, Barcelona Tech, Barcelona, Spain*

  Let $a \geq b \geq c$ be nonnegative real numbers. Prove that

  $$\frac{1}{3}\left(\frac{(a+b)(c+a)}{2+\sqrt{a+b}} + \frac{(c+a)(b+c)}{2+\sqrt{c+a}} + \frac{(b+c)(a+b)}{2+\sqrt{b+c}}\right) \leq \frac{(a+b)^2}{2+\sqrt{b+c}}.$$

- **5281:** *Proposed by Arkady Alt, San Jose, CA*

  For the sequence $\{a_n\}_{n\geq 1}$ defined recursively by $a_{n+1} = \dfrac{a_n}{1+a_n^p}$ for $n \in \mathcal{N}, a_1 = a > 0$, determine all positive real p for which the series $\sum\limits_{n=1}^{\infty} a_n$ is convergent.

- **5282:** *Proposed by Ovidiu Furdui, Technical University of Cluj-Napoca, Cluj-Napoca, Romania*