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 June 15, 2015

- **5349:** *Proposed by Kenneth Korbin, New York, NY*

  Given angle A with $\sin A = \dfrac{5}{13}$. A circle with radius 1 and a circle with radius x are each tangent to both sides of the angle. The circles are also tangent to each other. Find x.

- **5350:** *Proposed by Kenneth Korbin, New York, NY*

  The four roots of the equation

  $$x^4 - 96x^3 + 206x^2 - 96x + 1 = 0$$

  can be written in the form

  $$x_{1,2} = \left(\frac{\sqrt{a} + \sqrt{b + \sqrt{c}}}{\sqrt{a} - \sqrt{b + \sqrt{c}}} \right)^{\pm 1}$$

  $$x_{3,4} = \left(\frac{\sqrt{a} + \sqrt{b - \sqrt{c}}}{\sqrt{a} - \sqrt{b - \sqrt{c}}} \right)^{\pm 1}$$

  where a, b, and c are positive integers.

  Find a, b, and c if $(a, b, c) = 1$.

- **5351:** *Proposed by D.M. Bătinetu-Giurgiu, "Matei Basarab" National College, Bucharest, Romania and Neculai Stanciu, "George Emil Palade" School, Buzău, Romania*

  Let x, y, z be positive real numbers. Show that

  $$\frac{xy}{x^3 + y^3 + xyz} + \frac{yz}{y^3 + z^3 + xyz} + \frac{zx}{z^3 + x^3 + xyz} \leq \frac{3}{x + y + z}.$$

- **5352:** *Proposed by Arkady Alt, San Jose, CA*

  Evaluate $\sum\limits_{k=0}^{n} x^k - (x-1) \sum\limits_{k=0}^{n-1} (k+1) x^{n-1-k}$.