The Contest Corner is a new feature of *Crux Mathematicorum*. It will be filling the gap left by the movement of Mathematical Mayhem and Skoliad to a new on-line journal in 2013. The column can be thought of as a hybrid of Skoliad, The Olympiad Corner and the old Academy Corner from several years back. The problems featured will be from high school and undergraduate mathematics contests with readers invited to submit solutions. Readers’ solutions will begin to appear in the next volume.

Solutions can be sent to:

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or by email to

.crux-contest@cms.math.ca.

The solutions to the problems are due to the editor by 1 March 2014.

Each problem is given in English and French, the official languages of Canada. In issues 1, 3, 5, 7, and 9, English will precede French, and in issues 2, 4, 6, 8, and 10, French will precede English. In the solutions’ section, the problem will be stated in the language of the primary featured solution.

The editor thanks André Ladouceur, Ottawa, ON, for translating the problems from English into French.

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**CC41.** Ace runs with constant speed and Flash runs $x$ times as fast, $x > 1$. Flash gives Ace a head start of $y$ metres, and, at a given signal, they start off in the same direction. Find the distance Flash must run to catch Ace.

**CC42.** ΔABC has its vertices on a circle of radius $r$. If the lengths of two of the medians of ΔABC are equal to $r$, determine the side lengths of ΔABC.

**CC43.** A circle has diameter AB. P is a fixed point of AB lying between A and B. A point X, distinct from A and B, lies on the circumference of the circle. Prove that $\tan(\angle XAP) / \tan(\angle XAP)$ is constant for all values of $X$.

**CC44.** Let $a_0 = 1$ and for $n \geq 0$ let $a_{n+1} = a_n - \frac{1}{2}a_n^2$. Find $\lim_{n \to \infty} na_n$, if it exists.
CC45. The *baseball sum* of two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$ is defined to be $\frac{a+c}{b+d}$. Starting with the rational numbers $\frac{0}{1}$ and $\frac{1}{1}$ as Stage 0, the baseball sum of each consecutive pair of rational numbers in a stage is inserted between the pair to arrive at the next stage. The first few stages of this process are shown below:

<table>
<thead>
<tr>
<th>STAGE 0:</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 1:</td>
<td>0</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>STAGE 2:</td>
<td>$\frac{0}{1}$</td>
<td>$\frac{1}{3}$</td>
</tr>
<tr>
<td>STAGE 3:</td>
<td>$\frac{0}{1}$</td>
<td>$\frac{1}{4}$</td>
</tr>
</tbody>
</table>

Prove that:

(i) no rational number will be inserted more than once,
(ii) no inserted fraction is reducible, and
(iii) every rational number between 0 and 1 will be inserted in the pattern at some stage.

Crux Mathematicorum, Vol. 38(9), November 2012