Crux

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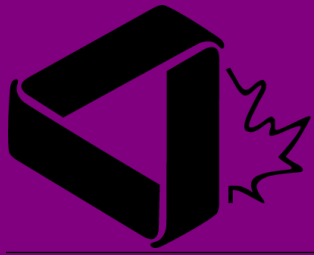

http://crux.math.ca/

Mathematicorum

The Back Files

The CMS is pleased to offer free access to its back file of all issues of Crux as a service for the greater mathematical community in Canada and beyond.

Journal title history:

- The first 32 issues, from Vol. 1, No. 1 (March 1975) to Vol. 4, No.2 (February 1978) were published under the name *EUREKA*.
- Issues from Vol. 4, No. 3 (March 1978) to Vol. 22, No. 8 (December 1996) were published under the name *Crux Mathematicorum*.
- Issues from Vol 23., No. 1 (February 1997) to Vol. 37, No. 8 (December 2011) were published under the name *Crux Mathematicorum with Mathematical Mayhem*.
- Issues since Vol. 38, No. 1 (January 2012) are published under the name *Crux Mathematicorum*.

EUREKA

No. 2

April 1975

Published by Algonquin College

Send all communications to the editor:
Léo Sauvé
Math-Architecture
Algonquin College
Col. By Campus
281 Echo Drive
Ottawa, Ontario
K1S 5G2

* * *

EUREKA DINNER

The first EUREKA dinner has come and gone, and a grand old time was had by all.

On April 1, seven enthusiastic problem solvers, all readers of EUREKA (a modest but encouraging beginning), got together at the Rideau Campus of Algonquin College. After a quick cafeteria dinner, the group repaired to a classroom for a problem-solving bull session which lasted a couple of hours.

The editor hopes that more readers will attend the next EUREKA dinner, which is announced below. He suggests it might be a good idea if most participants were to bring with them their solutions to one or more of the problems proposed so far in EUREKA. After they have been exposed to and discussed by the group, the solutions can then be handed to the editor, if they have not already been sent in.

But please come even if you have not had the time (or the luck!) to solve any of the problems. You can always join the fun and help tear apart the solutions presented by others.

The second EUREKA dinner will be held at 6.30 p.m. on May 13, 1975, in room C 426, of the Colonel By Campus of Algonquin College, 281 Echo Drive, Ottawa. This is your invitation to come.

Menu - Cold Buffet

For additional information, telephone Leo Sauve, 237-9414.

* * *

BE AMONG THE FIRST TO KNOW

It says in the current issue of TIME (April 21, 1975) professors at Stanford University have just programmed a computer to carry π to the millionth decimal place. The millionth digit turned out to be 5.

SOME POETS CAN COUNT

Now, of my threescore years and ten,
Twenty will not come again,
And take from seventy springs a score,
It only leaves me fifty more.

A.E.HOUSMAN, in *A Shropshire Lad*.

* * *

Solutions to the problems proposed last month in EUREKA No. 1 will be published next month in EUREKA No. 3. So far, the editor has received very few solutions from readers; he hopes and expects to receive many more before the approximate deadline, May 1, 1975.

Please send in solutions to *all* the problems you have solved, whether you have found them easy or difficult. It is hoped your response to this appeal will be like that of Napoleon, who once said, in another context:

> *Des preuves, des preuves! Oh! fort bien: s'il en faut, on en fera.*

* * *

Si vous croyez que quelques-uns de vos amis seraient intéressés à recevoir cette revue, veuillez nous envoyer, ou demandez-leur de nous envoyer, leur nom et adresse, et nous les ajouterons à la liste des abonnés.

And that goes for *your* friends too. If any of them would like to participate in the activities of EUREKA, just see to it that the editor is informed of their name and address. He will put them on the mailing list and send them a copy of all the back issues of EUREKA (both of them).

* * *

VITAL INFORMATION YOU MAY HAVE MISSED

The fourth of the eleven prose tales contained in *The Mabinogion*, a collection of medieval Welsh tales first translated into English (1838-1849) by Lady Charlotte Guest, is entitled *Math*.

* * *

PROBLEMS--PROBLÈMES

Problem proposals, preferably accompanied by a solution, should be sent to the editor, whose address appears on page 5.

For the problems given below, solutions, if available, will appear in EUREKA No. 4, to be published around June 15, 1975. To facilitate their consideration, your solutions, typewritten or neatly handwritten on signed, separate sheets, should be mailed to the editor no later than June 1, 1975.

11. *Proposed by Léo Sauvé, Algonquin College.*

A basket contains exactly *30* apples. The apples are distributed among *10* children, each child receiving n apples, where n is a positive integer. At the end of the distribution, there are n apples left in the basket. Find n.

12. *Proposed by Viktors Linis, University of Ottawa.*

There are about *100* apples in a basket. It is possible to divide the apples equally among *2*, *3*, and *5* children but not among *4* children. How many apples are there in the basket?

13. *Proposé par Léo Sauvé, Collège Algonquin.*

Montrer que la somme de p entiers positifs dont le plus grand est q est égale à la somme de q entiers positifs dont le plus grand est p.

14. *Proposed by Viktors Linis, University of Ottawa.*

If a, b, c are lengths of three segments which can form a triangle, show the same for $\frac{1}{a+c}$, $\frac{1}{b+c}$, $\frac{1}{a+b}$.

15. *Proposed by H.G.Dworschak, Algonquin College.*

Let A, B, C be three distinct points on a rectangular hyperbola. Prove that the orthocentre of $\triangle ABC$ lies on the hyperbola.

16. *Proposed by Léo Sauvé, Algonquin College.*

For $n = 1, 2, 3, \ldots,$ the finite sequence S_n is a permutation of $1, 2, 3, \ldots, n,$ formed according to a law to be determined. According to this law, we have

$$S_1 = (1)$$
$$S_2 = (1,2)$$
$$S_3 = (1,3,2)$$
$$S_4 = (4,1,3,2)$$
$$\ldots\ldots\ldots$$
$$S_9 = (8,5,4,9,1,7,6,3,2)$$

Discover a law of formation which is satisfied by the above sequences, and then give S_{10}.

17. *Proposed by Viktors Linis, University of Ottawa.*

Prove the inequality

$$\frac{1}{2}\cdot\frac{3}{4}\cdot\frac{5}{6}\cdots\frac{999999}{1000000} < \frac{1}{1000}\ .$$

18. *Proposé par Jacques Marion, Université d'Ottawa.*

Montrer que, dans un triangle rectangle dont les côtés ont 3, 4 et 5 unités de longueur, aucun des angles aigus n'est un multiple rationnel de π.

19. *Proposed by H.G.Dworschak, Algonquin College.*

How many different triangles can be formed from n straight rods of lengths $1, 2, 3, \ldots, n$ units?

20. *Proposé par Jacques Marion, Université d'Ottawa.*

La fonction $f:R\to R$ est définie par

$$f(x) = \begin{cases} x, & \text{si } x \text{ est irrationnel,} \\ p \sin \frac{1}{q} & \text{si } x = \frac{p}{q} \text{(rationnel irréductible)} \end{cases}$$

En quels points f est-elle continue?