newsletter's effectiveness. The first year we discovered that we had an unanticipated audience among extension students who take courses only in the evenings. We previously had virtually no communication with these students. They now feel less isolated. The second year we had a "Name in the News" contest, resulting in a multitude of clever titles. We have discovered that printing the names of the people who solve the problem of the week provides an incentive for others to work on these problems. Requests for copies of the newsletter have expanded our circulation to other segments of the campus.

There are three other newsletters in the North Central Section of the Mathematical Association of America, one annual and two weekly. Sharing newsletters within the Section has not only kept us in touch with our colleagues but has also led to joint ventures, such as the sponsoring of outside speakers and the interchange of local colloquium speakers.

Publishing a weekly newsletter does represent an expense both in time and money. Is the pay-off worth the price? We have tried to keep the costs low. The newsletter is brief (two sides of one page), the style is informal, and department members are generous in their contributions of announcements, items, and suggestions. Editing takes an hour or two per week. Secretarial work requires another one or two hours. The benefits certainly justify a cost of this magnitude.

PROBLEMS AND SOLUTIONS

EDITED BY VLADIMIR DROBOT

*Send all **proposed** problems, in duplicate if possible, to Professor Vladimir Drobot, Department of Mathematics, University of Santa Clara, Santa Clara, CA 95053. Please include solutions, relevant references, etc.*

An asterisk (*) indicates that neither the proposer nor the editors supplied a solution.

***Solutions** should be sent to the addresses given at the head of each problem set.*

A publishable solution must, above all, be correct. Given correctness, elegance and conciseness are preferred. The answer to the problem should appear right at the beginning. If your method yields a more general result, so much the better. If you discover that a MONTHLY *problem has already been solved in the literature, you should of course tell the editors; include a copy of the solution if you can.*

SOLUTIONS OF PROBLEMS DEDICATED TO EMORY P. STARKE

Switching the Stairway Light Switches

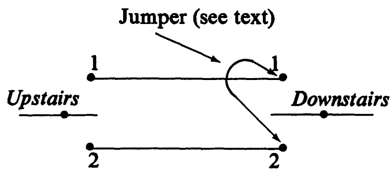
S 17 [1979, 591]. *Proposed by Leonard Gillman, University of Texas, Austin.*

When the upstairs switch is in one position, the downstairs switch turns the stairway light on or off as it should, but when the upstairs switch is in the other position the stairway light remains off irrespective of the position of the downstairs switch. Which is the defective switch?

I. *Solution by Edward T. Ordman, New England College.* Set the switches so the light is on. The condition may be rephrased as: When the switches are in this position, the light is on, but if either or both switches are changed the light will be off. Stated this way, the condition is symmetrical with regard to the two switches. Thus, no conclusion as to which switch is at fault can be drawn.

II. *Solution by Clayton W. Dodge, University of Maine at Orono.* In the usual wiring of 3-way switches to control a light from two locations the line feeds into the switch and is connected to terminal 1 when the switch is in one position and to terminal 2 when the switch is in the other position. The number 1 terminals of the two switches are connected by a wire, as also are the number 2 terminals. The line then feeds to the light from the second switch, which is a duplicate of the first switch. If, say, contact 2 of either switch fails to carry current, then each switch works normally when the other is in position 1; current will flow when both switches are in position 1, and only then. So if either switch is in position 2, the other switch cannot turn on the light. Hence either switch could be defective. Furthermore, any break in the wire joining the number 2 contacts would produce the same results; so it could be that neither switch is defective.

Assuming exactly one switch is defective, remove the cover plate from either switch and connect a jumper wire between the number 1 and number 2 terminals of that switch without removing the existing wiring. Then the switch that turns the light on and off is the defective one because it is the only one that can break the circuit. The good switch will not change the condition of the light; the bad one will turn it on and off.



Also solved by Ron M. Adin (Haifa), John D. Baildon, Ken Brown, Michael Brozinsky, Douglas E. Cameron, Randall J. Covill, Dan J. Eustice, James E. Falk, Joyce Killen Gendler, Michael Goldberg, Sylvan H. Greene, P. R. Halmos, Dale T. Hoffman, H. Kestelman (England), Uri Leron (Israel), O. P. Lossers (Netherlands), Maurice Nadler, G. W. Peck, Alan Shuchat, Robert Singleton, David Singmaster, Arthur J. Waldo, Howard J. Wilcox, Harald Ziehms (Federal Republic of Germany), Gene Zirkel, and the proposer.

ELEMENTARY PROBLEMS

Solutions of these Elementary Problems should be mailed in duplicate to Dr. J. L. Brenner, 10 Phillips Road, Palo Alto, CA 94303 (USA), by April 30, 1981. Please place the solver's name and mailing address on each (double-spaced) sheet. Include a self-addressed card or label (for acknowledgment).

E 2859. *Proposed by Ulrich Faigle, Technische Hochschule, Darmstadt, Germany.*

Let the sequence $\{a_n\}$ of real numbers be defined by $a_n = a_{n-1}(a_{n-1} - 1)$ for $n \geq 2$. For what (initial) values of a_1 will this sequence converge?

E 2860. *Proposed by J. Martin Borden, University of Illinois.*

Let $\{a_n\}$ $(n=1,2,\ldots)$ be a nondecreasing sequence, $0 \leq a_n \leq a_{n+1}$. Assume $a_{mn} \geq ma_n$ for all m, n, and also $\sup(a_n/n) = c < \infty$. Must a_n/n have a limit?

E 2861. *Proposed by George Shulman, Teaneck, N.J.*

Let $p > 3$ be a prime; A_l is the lth elementary symmetric function of the set $\{1,2,\ldots,p-1\}$. If l is odd, $1 < l < p$, prove $A_l \equiv 0 \bmod p^2$. (Wolstenholme's theorem is the case $l = p-2$.) Can the relation $A_l \equiv 0 \bmod p^2$ hold if l is even?

E 2862. *Proposed by T. Keller, Honolulu, Hawaii.*

For $n \geq 3$, show that $n-1$ straight lines are sufficient to go through the interior of every square of an $n \times n$ chessboard. *Are $n-1$ lines necessary?