ALLAN J. GOTTLIEB, '67

Going Out on a LYM

I continue to receive lovely letters concerning the return of "Puzzle Corner." Thank you all. We are out of chess-, computer-, and go-related problems. If you wish to see them, send them.

Problems

A/S 1. We begin with a bridge problem from Don Boynton, who needs to make 7 hearts against any defense with an opening lead of the queen of clubs.

North
♠ 2
♥ 3 2
♦ A K 2
♣ A K 7 6 5 4 3

West
♠ K 10 8
♥ 5
♦ Q J 10 9
♣ Q J 10 9 8

East
♠ 7 6 5 4 3
♥ Q 10 8 7
♦ 8 7 6
♣ 2

South
♠ A Q J 9
♥ A K J 9 6 4
♦ 5 4 3
♣

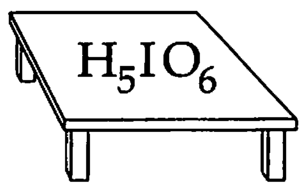
A/S 2. Thomas Weiss wants you to find a crossword puzzle using as few squares as possible but satisfying:
(1) All 26 letters of the English alphabet are used at least once each.
(2) No proper nouns, abbreviations, contractions, acronyms, or foreign words are used.
(3) All letters are used to form words both horizontally and vertically.
(4) Radial symmetry about the center is achieved, as is common in American crossword puzzles.

A/S 3. Our last regular problem is from Nob. Yoshigahara. Choose two digits excluding 0 and 1 and consider the set of numbers that contain each of the two digits at least once. For example, 4 and 8 gives 8848, 4884, 84 and infinitely many others. Now consider the smallest member of this set that is a multiple of the two original digits. Call this the LYM (least Yoshigahara multiple). In our example the LYM is 48; the LYM of 3 and 5 is 3555. Among the 28 pairs of digits, 4 lead to sets that do not contain a multiple of the digits and, for these pairs, the LYM is not defined. For example, all multiples of 2 and 5 end in 0 so are not in the set constructed from 2 and 5. The LYM of 2 and 4 is 24, which is the smallest of the LYMs. What is the largest?

SEND PROBLEMS, SOLUTIONS, AND COMMENTS TO: ALLAN J. GOTTLIEB, '67 THE COURANT INSTITUTE NEW YORK UNIVERSITY 251 MERCER ST. NEW YORK, N.Y. 10012, OR TO: gottlieb@nyu.edu

Speed Department

What would you call



Solutions

APR 1. As mentioned last issue there was an unfortunate typo in the problem as stated in April. The corrected problem was printed as M/J 1.

APR 2. Warren Himmelberger sent us an old chestnut (really old coconut) involving a monkey and some monkey business. In addition to the original problem, which is given below, Himmelberger suggests some interesting generalizations. Anyone interested in these extensions should write to Faith Hruby at *Technology Review* and ask for a copy of Himmelberger's Feb. 1973 article from the *Mathematics Teacher*.

Four men are going to divide a pile of coconuts equally the following day. But, during the night, the first man decides to take his share secretly. He divides the coconuts into four piles, finds there is one nut left over and gives it to the monkey. He takes his share and puts the other three shares back. The second, third, and fourth man, in turn, proceed to do the same thing, each giving his share, and returning the other three shares to the pile. Then, in the morning, the four men meet to divide the remaining nuts into equal shares, and find there is again one nut left for the monkey. The puzzle is to find the least number of nuts in the original pile.

Mary Lindenberg reports a strange coincidence concerning this problem: An "Ask Marilyn" column in *Parade* magazine this past March included the piles of coconuts problem—and the very next day I received the April *TR* with an expanded version of the puzzle! My answer:

Let C = the total number of coconuts, then
let C_1 = the number of nuts the 1st thief steals,
C_2 = the number of nuts the 2nd thief steals,
C_3 = the number of nuts the 3rd thief steals,
C_4 = the number of nuts the 4th thief steals, and
C_5 = the number of nuts the 5th thief steals.
Then $C = 4C_1 + 1$; $3C_1 = 4C_2 + 1$; $3C_2 = 4C_3 + 1$; $3C_3 = 4C_4 + 1$; and $3C_4 = 4C_5 + 1$. By substituting the last equation in the one preceding it, and continuing this way we get

$$C = \frac{1024C_5 + 781}{81} = 12C_5 + 9 + \frac{52(C_5 + 1)}{81}.$$

For C to be an integer, C_5 has to be at least 80. So the least number of nuts in the original pile has to be $C = 12(80) + 9 + 52 = 1021$.

Several readers gave solutions for larger numbers of men and James Abbott notes that Martin Gardner's *2nd Scientific American Book of Mathematical Puzzles and Diversions* also discusses the general problem. Gardner's column ran for decades in *Scientific American*. Indeed, it was only after he stepped down that I considered my tenure at *Technology Review* to be of significant duration.

APR 3. Stephen Callaghan proposes the following problem. It looks difficult to me but I have been proven wrong in this regard before! You are to find the number of "distinct" mxm matrices with n<m 1s and m-n 0s in each row and column. Two matrices are considered equivalent (i.e. not distinct) if one can be converted to the other by permuting the rows and the columns. As an example, for m=4 and n=2, the following two matrices are distinct.

```
1100   1100
1100   1010
0011   0101
0011   0011
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Looks like I was right! The only response was from Bob High who notes a similarity with problem E3419 in the January 1991 *American Mathematical Monthly*. High has determined that when n=2, the answer is the same as the number of partitions of m into pieces all of size at least 2.

Other Responders

Responses have also been received from J. Abbott, A. Apter, R. Bart, F. Carbin, D. Church, S. Feldman, M. Gennert, M. Gilman, J. Grossman, W. Hartford, R. Hess, M. Lively, R. Marks, A. Ornstein, P. Rakita, K. Rosato, N. Spencer, A. Taylor, N. Wickstrand, W. Woods, D. Young, and H. Zaremba

Proposer's Solution to Speed Problem

Periodic table.