This coming June will be the 40th of my graduation from MIT and so my class of 1967 will be celebrating our 40th reunion. Since my wife is Boston most weekdays, I am planning on attending would be happy to meet readers of this column who are there as well. I will give more information in a latter issue when my plans are better established.

It has been a year since I reviewed the criteria used to select solutions for publication. Let me do so now.

As responses to problems arrive, they are simply put together in neat piles, with no regard to their date of arrival or postmark. When it is time for me to write the column in which solutions are to appear, I first weed out erroneous and illegible responses. For difficult problems, this may be enough; the most publishable solution becomes obvious. Usually, however, many responses still remain. I next try to select a solution that supplies an appropriate amount of detail and that includes a minimal number of characters that are hard to set in type. A particularly elegant solution is, of course, preferred as are contributions from correspondents whose solutions have not previously appeared. I also favor solutions that are neatly written, typed, or sent via email, since these produce fewer typesetting errors.

PROBLEMS

N/D 1. We start with a Bridge problem from Larry Kells who, rather than worrying about making his contract against any opponents' distribution, is content to make it against just one. Specifically he wants you to find a distribution such that South can make a slam against best defense.

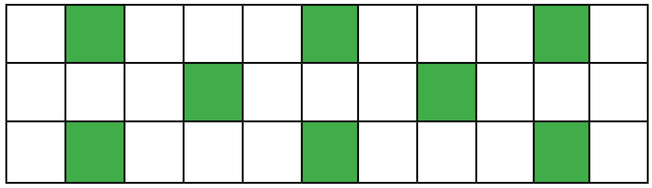
♠ - 10765
♥ - KQJ
♦ - 5
♣ - 6

♠ - A843
♥ - A97
♦ - AKQ73
♣ - AK842

N/D 2. Our next problem is a variation on Donald Aucamp's three hat problem that appeared in the October 2003 issue. Aucamp's variation proceeds as follows.

Three logical people, A, B, and C, are wearing hats with positive integers painted on them. Each person sees the other two numbers, but not his own. Each person knows that the numbers are positive integers and that one of them is the sum of the other two. They take turns (A, B, then C, then A, etc.) in a contest to see who can be the first to determine his number. In the first two rounds A, B, and C all pass, but in the third round C correctly asserts that his number is 60. What are the other two numbers and how did C determine his was 60?

N/D 3. For our final regular problem Richard Hess offers us a "cross-number" problem in which you are to place 13 three-digit squares in the grid below.



SPEED DEPARTMENT

A two part quickie from Ermanno Signorelli. First, you are in a race and pass the second place runner, what position are you in? Second, you are in a race and pass the last place runner, what position are you in?

SOLUTIONS

J/A 1. We begin with an unusual Bridge problem from Larry Kells. What is the largest possible margin of victory in a rubber where no contract is defeated?

Most solutions were under 12,000 except for Jorgen Harmse's at 13,950 and Guy Steele and the proposer's at 14,570. I paraphrase Kells solution below.

A key point, shared by other solutions, is that it pays to have the opponents win some hands for two reasons. If they make one club and you have 150 honors, you gain 130 points. Letting them win a game is also good as it permits more hands. There are 21 hands in the rubber, 19 of which are of two types. Type A: You bid 1C and make 7C doubled and have 150 honors. Type B: Your opponents bid and make 1C; you have 150 honors.

Hands 1 and 2 are type A giving you a gain of 2×840=1680 points. Hands 3-6 are type B giving you a gain of 4×130=520 points. Hand 7 is unique. You bid and make 7NT redoubled with 150 honors for a gain of 2130 points. This ends game 1 with you leading by 4330.

Hands 8 and 9 are again type A, but you are vulnerable so your gain is 2×1440=2880 points. Hands 10-14 are type B giving you a gain of 5×130=650 points. This ends game 2. Your lead increased by 3530 points and is now 7860.

Hands 15 and 16 are type A giving you a gain of 2880 points. Hands 17-20 are type B giving you a gain of 520 points. Hand 21 is unique. You bid 1NT and make 7NT redoubled with 150 honors for a gain of 3310, including the rubber bonus. This ends game 3 and the rubber. Your lead increased by 6710 and ends at 14,570.

J/A 2. Richard Hess offers a problem somewhat related to our yearly challenge. Hess notes that a good approximation to π using each digit 1 to 9 exactly once is

$$\pi = 3 + \frac{16 - 8^{-5}}{97 + 2^4}$$

Hess first wants you to do better, still using 1 to 9 exactly once each. You may use +, -, *, /, exponents, decimal points, and parentheses, but may not use any other operators or functions. He also asks, if you are instead allowed 0 to 9 exactly once each (i.e., 0 is added to the list of digits), how good an approximation can you find (again limited to +, -, *, /, exponents, and parentheses)?

The best solution received was from Joel Karnofsky. As he points out, this solution is almost surely not optimal so perhaps we will see several "Better Late Than Never" improvements in the months to come. Karnofsky writes:

"The July/August Puzzle Corner #2 asks for approximations to π using each digit 1 to 9 exactly once combined only with +, -, *, /, exponents, decimal points and parentheses.

The (corrected) example to improve on is:

$$3 + \frac{16-8^{-5}}{97+2^4} - \pi \cong -3.3 \times 10^{-9}.$$

The simplest example I found is:

$$3 + \frac{75248}{9^6-1} - \pi \cong -3.3 \times 10^{-10}.$$

The best example I found is:

$$3.14 + (7^{-.9^{-6}} + {}^2/8)^5 - \pi \cong -9.3 \times 10^{-11}.$$

The implicit problem is to find the best such approximation. Unfortunately, my estimate is that there are on the order of 1016 unique values that can be generated under the given conditions and I cannot see how to avoid checking essentially all of them to find a guaranteed best. With maybe a thousand computers I think this could be done in my lifetime.

My estimate is based on a *Mathematica* program that recursively generates expression trees, ignoring some unlikely cases and many duplicates as it goes. I generated selected branches of the full tree and estimated the full tree's size from estimates of the branching number at each level. Further, the closeness of the best approximations I found seemed to be roughly the inverse of the number of cases I checked. This is consistent with the distribution of all generatable positive values, which is roughly log normal with a broad mean near 2 (and with spikes near simple rational numbers and "long tails").

All this suggests my examples are many orders of magnitude away from being best. For this reason I did not attempt to look for even better approximations using the digits 0 to 9 since it would likely be just as productive to search with only 1 to 9."

As predicted, a better solution has just arrived as we are going to press. Sergey Ioffe sent us the following "(using a genetic-like algorithm applying mutations to a population of parse trees and keeping some number of best ones)."

3+((2^((((8+5)/4)^(-6))*9))/7.1)−π = -2.8141e-11
3+((5^(-(8^(-((10+(2^(-(9+6))))/4)))))/7)−π = 1.9332e-11

J/A 3. Phil Latham notes the following curious property of the 6-letter word "priest." If you remove any one of the letters, the remaining 5 letters can be arranged to form an English word. For example, if you delete the "p," you can form "tries;" if you delete the "r," you can form "spite." What is the longest English word having the property that, if any letter is removed from the word, the remaining letters can be arranged to form an English word. If the original word contained say 3 T's, and a T is removed, the new word must contain 2 T's; if some other letter was removed, the new word must contain 3 T's.

If one requires that your editor (or unix aspell) has heard of the word, the longest solutions found have 10 letters. Guy Steele offers us the highly appropriate "reductions," which gives seduction, inductors, countries, doctrines, detrusion, coinsured, construed, reinducts, custodier, and reduction. Usman Mobin found "resistance" and feels that it would be harder to find words shorter than "priest" with this property. Dropping the restriction to my, hardly impressive, vocabulary Aaron Ucko found the 11-letter word enigmatists (forming missetting, misstating, ministates, magnetists, instigates, stigmatise, estimating, and misseating)

BETTER LATE THAN NEVER

J/A SD. I thank Sue Kayton and Dan Karlan for reporting my misstating this problem. I inadvertently omitted the proposer's comment that the clock chimes once on each half hour. Sorry.

OTHER RESPONDERS

Responses have also been recieved from D. Bator, G. Blondin, M. Bolotin, J. Feil, S. Feldman, E. Friedman, R. Giovanniello, R. Hess, A. Justin, S. Nason, E. Nelson-Mebly, A. Ornstein, E. Osman, F. Powsner, K. Rosato, M. Strauss, R. Wake, P. Worfolk, and G. Yu.

PROPOSER'S SOUTION TO SPEED PROBLEM

Second and impossible.

Send problems, solutions, and comments to Allan Gottlieb, New York University, 715 Broadway, Room 712, New York NY 10003, or to gottlieb@nyu.edu.