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 saved in neat piles, with no regard to their postmark or date of arrival. When it is time for me to write the column in which the 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 remain. I then try to select a solution that supplies an appropriate amount of detail and 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 by e-mail, since these simplify typesetting.

PROBLEMS

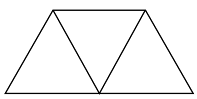
N/D 1. Larry Kells wants to know the minimum number of high-card points that East-West can have (their hands are to be specified) to guarantee that North-South cannot make a game in any denomination (including no-trump), regardless of the distribution of the North-South cards.

N/D 2. Bill Deane's son Mike drives an old Jeep that has sustained at least four cracked windshields. Mike blames the steepness of the Jeep windshield compared with those of most other cars.

Stones strike the windshield at various angles A from the horizontal. For which values of A is the normal component of the force on a Jeep windshield (which we assume is sloped 60° from the horizontal) greater than it would be on a standard windshield (sloped 30° from the horizontal)?

N/D 3. Richard Hess sent us several tiling problems from Bob Wainwright. Here are the first two. If they are popular, other (probably more difficult) examples will appear in later issues.

Below is an equilateral trapezoid composed of three equilateral triangles. You are to dissect it into two similar parts (i.e., parts of the same shape). Each part must be connected and have a finite number of sides. For the first problem, the parts must be of the same size, and for the second problem they must be of different sizes.



SPEED DEPARTMENT

Charles Morton noticed that his Camry's odometer read 179379 and wondered what fraction of *n*-digit numbers have all odd digits.

SOLUTIONS

J/A 1. Joseph Feil needed only six high-card points for 3 no-trump and nine points for 6 no-trump. His solutions follow. Cards in suits listed as "arbitrary" can be distributed in any legal manner.

North
♠ void
♥ void
♦ arbitrary
♣ arbitrary

West
♠ A K x x x x
♥ A K x x x x x
♦ void
♣ void

East
♠ void
♥ void
♦ arbitrary
♣ arbitrary

South
♠ Q J 10 9 8 7 x
♥ Q J 10 9 8 7
♦ void
♣ void

North
♠ void
♥ void
♦ arbitrary
♣ arbitrary

West
♠ K
♥ K Q J 10 9 8 7 6 5 4 3 2
♦ void
♣ void

East
♠ Q
♥ void
♦ arbitrary
♣ void

South
♠ A J 10 9 8 7 6 5 4 3 2
♥ A
♦ x
♣ void

J/A 2. All responders agree that a Sudoku-like eight-by-eight grid in which no number repeats in any row, column, or diagonal cannot be filled in with fewer than two blanks.

Richard Korf writes that if the diagonals are allowed to wrap around, the resulting design is called a pandiagonal Latin square, or a Knut Vik design, after the author of a 1924 paper on the subject.

Joel Karnofsky's solution, including a Mathematica program, is on the Puzzle Corner website, cs.nyu.edu/~gottlieb/tr.

The following solution is from Steven Gordon.

"There are no solutions to J/A 2 having one or fewer blank squares. There are four unique solutions with two blank squares. By 'unique' I mean that you cannot convert one to another simply by rotation, by flipping, or by substituting one number for another.

"Solutions were found using a VB.Net program that is available at faculty.babson.edu/gordon/techreviewsolutionJA2.htm. All four solutions with two blanks can also be found at this site.

"Since the numbers in the first row can always be mapped to the numbers 1 through 8, the program fills the first row with the numbers in that order. It then solves the problem with zero blank spaces by attempting to fill in rows two through eight. It first tries to find spaces for the number 1 that don't violate the constraints of the problem. It then attempts to do the same for 2, 3, etc. In placing the numbers into a row, it puts them as far to the left as possible. If it turns out that a number cannot be put in a particular row, the program backtracks, moving the number in the previous row farther to the right. If, after backtracking and going forward, it cannot place a particular number in the grid, it removes the number and backtracks to the preceding number, starting at the last row. Unfortunately, only six numbers can be placed in the grid without causing a conflict.

"To solve the problem with one blank space, the program follows a similar solution to the above 7 × 8 = 56 times, with each solution assuming that one of the eight numbers is not present in one of the seven unfilled rows. We do not need to address the possibility that the blank is in the first row, since that would be equivalent to a solution with the first row filled and the last row having a blank.

"The four solutions with two blanks, two of which are below, were derived by examining solutions with one blank that successfully placed the numbers 1 through 7 but were not able to place the number 8."

1	2	3	4	5	6	7	8
8	5	7	6	3	2	4	1
2	3	X	5	4	X	6	7
6	7	4	8	1	5	2	3
4	8	6	2	7	3	1	5
7	1	5	3	6	4	8	2
5	6	2	1	8	7	3	4
3	4	8	7	2	1	5	6

1	2	3	4	5	6	7	8
8	5	7	6	3	2	4	1
2	3	8	5	4	1	6	7
6	7	4	X	X	5	2	3
4	1	6	2	7	3	8	5
7	8	5	3	6	4	1	2
5	6	2	8	1	7	3	4
3	4	1	7	2	8	5	6

J/A 3. Only Joel Karnofsky was able to generate all 129 numbers. He writes, "Below is my solution to J/A 3 2010. I 'cheated' and used my program to solve the yearly puzzle for 2569. This gave solutions without decimals for all but 46, 52, 88, 90, 108, 110, 119, and 126. Looking at solutions using 2269 and dividing by .5 where I had multiplied by 2 gave solutions for all of these but 88 and 108. I found 108 from solutions for 236 ($3 = 9^{.5}$), so only 88 required some thought.

"Thank you again for the Puzzle Corner."

0 = 2 – (5 + 6) + 9
1 = $(5 - 6)^{92}$
2 = 6 × 9 – 52
3 = 62 – 59
4 = (29 – 5)/6
5 = $2^6 - 59$
6 = (56 – 2)/9
7 = (26 + 9)/5
8 = 56/(9 – 2)
9 = ((2 + 5) – 6) × 9
10 = 25 – (6 + 9)
11 = 2 – (5 – 6) × 9
12 = 26 – (5 + 9)
13 = 2 × (5 + 6) – 9
14 = 2 × (9 – 5) + 6
15 = (2 × 5)/6 × 9
16 = $9^2 - 65$
17 = 69 – 52
18 = 29 – (5 + 6)
19 = 5 × 9 – 26
20 = 2 × (6 – 5 + 9)
21 = (2 + 5) × (9 – 6)
22 = (25 + 6) – 9
23 = $59 - 6^2$
24 = 5/2 × 6 + 9
25 = $9^2 - 56$
26 = 2 × 6 + 5 + 9
27 = 56 – 29
28 = 25 – 6 + 9
29 = $29^{(6-5)}$
30 = 26 – 5 + 9
31 = $95 - 2^6$
32 = (69 – 5)/2
33 = 59 – 26
34 = 2 × (5 + 9) + 6
35 = $2^5 - 6 + 9$
36 = 65 – 29
37 = 52 – (6 + 9)
38 = 56 – 2 × 9
39 = 6 × (9 – 5/2)
40 = 25 + 6 + 9
41 = 2 + 5 × 6 + 9
42 = 2 × (5 × 6 – 9)
43 = 96/2 – 5
44 = 69 – 25
45 = 56 – (2 + 9)
46 = (29 – 6)/.5
47 = 59 – 2 × 6
48 = 62 – (5 + 9)
49 = (2 + 56) – 9
50 = $5 + 6^2 + 9$
51 = 59 – (2 + 6)
52 = 29/.5 – 6
53 = 5 + 96/2
54 = 65 – (2 + 9)
55 = (2 + 59) – 6
56 = 59 – 6/2
57 = 2 × 6 + 5*9
58 = (2 + 65) – 9
59 = 29 + 5 × 6
60 = $(2^6 + 5) - 9$
61 = 2 + 5 + 6 × 9
62 = 59 + 6/2
63 = 56 – 2 + 9
64 = $96 - 2^5$
65 = 5 × (6 – 2 + 9)
66 = 2 – 5 + 69
67 = 2 + 56 + 9
68 = $2^6 - 5 + 9$
69 = 95 – 26
70 = $9^2 - (5 + 6)$
71 = 96 – 25
72 = 5 – 2 + 69
73 = 5 × (6 + 9) – 2
74 = 2 × 9 + 56
75 = 25 × (9 – 6)
76 = 2 + 5 + 69
77 = 2 + 5 × (6 + 9)
78 = 52/6 × 9
79 = 25 + 6 × 9
80 = $5 - 6 + 9^2$
81 = 92 – (5 + 6)
82 = (5 + 9) × 6 – 2
83 = 2 × 9 + 65
84 = 2 × 5 × 9 – 6
85 = 26 + 59
86 = 96 – 2 × 5
87 = 95 – (2 + 6)
88 = 9/(.6 – .5) – 2
89 = 96 – (2 + 5)
90 = (2/.5 + 6) × 9
91 = 2 – 6+95
92 = (6 – 5) × 92
93 = 2 – 5 + 96
94 = 25 + 69
95 = $59 + 6^2$
96 = (25 – 9) × 6
97 = (5 + 6) × 9 – 2
98 = 6/2 + 95
99 = 5 – 2 + 96
100 = $(5 - (6 + 9))^2$
101 = $2^5 + 69$
102 = 2 × (5 × 9 + 6)
103 = 2 × 56 – 9
104 = 26 × (9 – 5)
105 = (2 + 5) × (6 + 9)
106 = 2 × 5 + 96
107 = 2 × 6 + 95
108 = $9^{.5} \times 6^2$
109 = $2^6 + 5 \times 9$
110 = 2 + 6 × 9/.5
111 = $5 \times 6 + 9^2$
112 = 2 × 59 – 6
113 = 2 × 6 × 9 + 5
114 = (2 × 5 + 9) × 6
115 = (29 – 6) × 5
116 = $5^{6/2} - 9$
117 = (2 +5 + 6) × 9
118 = 2 × (5 + 6 × 9)
119 = $2^6/.5 - 9$
120 = (2 × 9 + 6) × 5
121 = 25 + 96
122 = 5 × 6 + 92
123 = $2^6 + 59$
124 = 2 × 59 + 6
125 = 25^{9-6}
126 = (2 + 6/.5) × 9
127 = $2 + 5^{9-6}$
128 = $2^5 + 96$

BETTER LATE THAN NEVER

M/A 2. Joel Karnofsky and David Chau each found a 100-digit prime starting at the 238th digit of π and a 1,000-digit prime starting at the 1,700th digit of π . Chau also found that the first 5,000-digit prime starts at the 2,322nd digit. Karnofsky computed the starting location for primes of length 1 to 500. Most occurred fairly early compared to their length, but a few did not (the first 305-digit prime occurs at location 4,506).

J/A SD. Dick Swenson notes that the field was not specified. If we use Z_2 rather then the complex numbers, then 1 has equal additive and multiplicative inverses (namely, itself).

OTHER RESPONDERS

Responses have also been received from F. Cann, G. Coram, D. Dechman, J. Hardis, O. Helbok ,W. Lemnios, E. Signorelli, M. Silfen, S. Silverstein, and J. Wise.

PROPOSER'S SOLUTION TO SPEED PROBLEM

If we consider only properly written numbers, $\frac{5^n}{9 \times 10^{n-1}}$. If we permit "odometer numbers," which can have leading zeros, $1/2^n$. ■

Send problems, solutions, and comments to Allan Gottlieb, New York University, 715 Broadway, Room 712, New York, NY 10003, or to gottlieb@nyu.edu. For other solutions and back issues, visit the Puzzle Corner website at cs.nyu.edu/~gottlieb/tr.