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. This may be enough for difficult problems ; the most publishable solution becomes obvious. Usually, however, many responses still remain. Next, I 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 preferred, of course, as are contributions from correspondents whose solutions have not previously appeared. I also favor solutions that are neatly written, typed, or sent via e-mail, since these produce fewer typesetting errors.

Although it is only April now, by the time you are reading this column our older son David will have graduated MIT with an SB (Course VI) and an SM (the information technology program in Course I). Another, perhaps greater, achievement of David's MIT career is that he met Sarah Simmons, also graduating from MIT in June (Course VII) and they will be married on July 19. I dedicate this column to their long and joyous life together.

PROBLEMS

J/A 1. Larry Kells, presumably a law-abiding citizen in normal circumstances, wants us to violate the Law of Total Tricks as violently as possible.

He writes, "Have you heard of the Law of Total Tricks? This is a heuristic which says that the expected number of tricks North-South can take declaring in their longest trump suit, added to the number of tricks East-West can take declaring in their longest suit, is usually equal to the number of trumps North-South have in their suit, added to the number of trumps East-West have in theirs. This is often useful for competitive bidding decisions.

"My question is, how badly can this law be violated? What is the greatest possible excess of total tricks over total trumps (with best play and defense)? What is the greatest possible deficit? (Assume that for each partnership, the declarer is whichever one would make the most tricks with their suit as trumps, if it makes a difference which side plays it.)"

J/A 2. Jerry Grossman has a figure consisting of six points, five of them arranged in a regular pentagon and one more in the center of the pentagon. This figure has 10 line segments—the five sides of the pentagon and a segment from the center to each point on the pentagon.

There are various subsets of five of these segments that can be deleted without disconnecting the figure (for example, one of the segments around the rim and four of the spokes). On the other hand, if we delete some subsets of five of these segments, then we disconnect the figure (for example, if we delete the five spokes, then the center is no longer connected to the points on the rim). Find out how many subsets of each kind there are.

J/A 3. With this being a U.S. presidential election year, I feel a dart-throwing problem is in order. So here is one (in a sense, three) from Frank Rubin, who writes, "I recently came across a puzzle intended for young children. They were shown a bull's-eye target, with each concentric ring marked with a different score between 1 and 25, inclusive. The children were asked to find how many darts hit each ring to give a total score of 50. Unfortunately, there were two distinct ways of scoring 50."

Your task is to reconstruct the target, given that there were two distinct ways of scoring a) every value from 44 to 65, inclusive; b) the values 19, 50, and 63; and c) the values 35, 50, and 98. (These are three independent problems.)

SPEED DEPARTMENT

A lighthearted offering from Hugh Blumenfeld who wants an to know the "scientific" units for each of the following:

- GBW/JFK.
- Tom Ridge's one trillion Timexes.
- Air conditioning units needed to offset all the hot air in Washington.
- Naughty sexual behaviors that dwindle to insignificance in a politician of your own party.
- The same failings in members of the opposing party.
- Sir Isaac and his son at a reception.
- The power of pain.
- An interminably pointless anecdote told in a diner.
- In cardiology, a trillion lub-dubs.
- Forty-nine smoldering cigarettes.

SOLUTIONS

MAR 1. Larry Kells tells us the time his friends encountered their worst luck ever: "My friend just told me about the worst luck he has had at the bridge table since he got remarried. He and his wife had all the aces, kings, queens, jacks, and tens, three nines and three eights. Yet, as the cards lay they could not make a grand slam in any suit or no trump from either side of the table. This seemed incredible to me, both because of the sheer power of their hands and because of how much his bridge luck had turned around with his new wife. Was the magic gone? 'No,' he said, 'She had a premonition that things weren't breaking well, and stopped at 6NT. This was in a team match and at the other table they bid 7NT and went down, so we cleared a bundle of IMPs!' So much for his 'worst luck.' Can you construct such a deal?"

Mark Bolotin notes that not only did she have a correct premonition that things weren't breaking well, but she and her husband found their way to the only slam that makes.

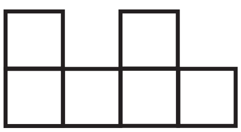
The hand was:

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

Seven no trump goes down on any lead except a spade by East. Six spades clearly goes down with passive defense. Six hearts, six diamonds, and six clubs all fail as the defense follows the following guidelines:

1. Lead a trump whenever declarer and dummy still have trumps.
2. If void in trumps, the opening leader leads a red suit for partner to ruff.
3. Otherwise, put the lead back in North's hand.
4. If none of the above is possible, force South to ruff.

MAR 2. Our last regular problem is from Richard Hess and Robert Wainwright, who want you to design a connected tile so that five of them cover at least 93 percent of the area of the hexomino below. The *n* tiles are identical in size and shape, but may be turned over so that some are mirror images of the others. They must not overlap each other or the border of the hexomino:



Eugene Sard notes that the 93+ percent coverage suggests that each tile has area A = 1 1/8 (where each square in the problem has area 1) since $5A/6 = 15/16 = .9375$. The second area *A* tile he tried worked. The figure below is a JPEG sent by Geoffrey Coram:

BETTER LATE THAN NEVER

Y2003. Ermanno Signorelli and Keith Bonawitz offer the following improvements:

2 = 2+(0*30)
8 = 2*(0+0+3)
17 = 20-(0+3)
60 = 20*(0+3)

OCT 2. Joel Karnofsky, Parsa Bonderson, and Larry Casey have each noticed an important gap in the solution. The proof given shows that if the ratios are 5 to 2 to 3, then there is a unique solution. What is not shown is that there are no other ratios for which there is no way for *A* to deduce his number. All three responders have given extended solutions that do not require we assume a certain ratio, but I don't believe anyone has shown that there is *no* other logical way for *A* to deduce his number is 50. It is often true that proving non-existence is quite difficult.

OCT 3. Joel Karnofsky was intrigued by this problem and sent us quite a solution. His summary is below and the full solution, including the Mathematica code and an interesting picture, appears on the Puzzle Corner Web page linked from my home page, cs.nyu.edu/~gottlieb. Karnofsky writes, "The Ten Resistor October 3 problem seemed kind of tedious to me, but since nobody reported a solution, I couldn't resist. It turned out to be more interesting than I expected. The answer is 4,039 distinct resistances are possible with 10 one-ohm resistors. More generally, for numbers of resistors from 1 to 11 the number of values are: 2, 4, 8, 16, 36, 80, 194, 506, 1,400, 4,039, and 12,044. These counts all include infinity as a possible value, corresponding to an open circuit. Including infinity may be a matter of personal preference, but it makes a few details more natural. To explain how I got these numbers, see the full solution on the Web. Here are the first few paragraphs from it:

"Conceptually, this problem is easy: model a resistor network as a graph with two distinguished nodes, where edges correspond to resistors, nodes to junctions, and the distinguished nodes to the points across which the resistance is computed. Then, generate all such 10 edge graphs and compute the resistance for each (using Kirchoff's laws) and collect all the unique values. The practical problem is that the enormous number of such graphs makes a brute force approach unrealistic.

"Two ideas will be used to reduce the number of graphs considered. First, a unique normal form will be used to represent each isomorphism equivalence class of graphs, so that redundant graphs can be eliminated as new ones are generated recursively by adding edges. Second, since it is easy to compute the resistance of a graph that can be decomposed into either the serial or parallel combination of two smaller graphs, it is only necessary to generate indecomposable ones.

"The key theoretical idea I derive is that a serial/parallel indecomposable graph with more than one edge contains a subgraph consisting of exactly two non-intersecting loop-free paths between the distinguished nodes and a third, loop-free path, connecting interior points on the first two."

OTHER RESPONDENTS

D. Dechman, G. Eckhardt, J. Feil, R. Giovaniello, R. Hess, A. Ornstein, J. Rinde, K. Rosato, L. Satori, L. Schaider, T. Terwilliger, H. Thiriez.

PROPOSER'S SOLUTION TO SPEED PROBLEM

One millileader, terawristwatches, AC/DC, picodillos, decadents, two Newton meeters = two family Joules, watt hertz, yotta yotta yotta, teradactyl, seven septembers.

Send problems, solutions, and comments to Allan Gottlieb, New York University, 715 Broadway, 7th Floor, New York NY 10003, or to gottlieb@nyu.edu.