This fall was the best foliage season I can remember here in the northern suburbs of New York City. We had no storms, the weather was mild, and the colorful leaves stayed on the trees for many weeks. But that time has now passed, and as I write this column, we have just had our first snowfall, a scant two inches. Our younger son, Michael, who lives in Syracuse, just had his first snowfall as well, a scant two *feet*. His brother, David, lives in San Diego, where snow is forbidden by law, which is a good thing when you consider the number of highway fatalities even a dusting would probably cause.

PROBLEMS

M/A 1. Ira Rosenholtz wants you to find a legal chess position in which White has a king, a queen, the first move, and 31 legal moves; Black has a king, a rook, a bishop, and a pawn on its original square of a7; and yet Black wins with best play on both sides.

M/A 2. Ermanno Signorelli offers a problem that reminds me of the time I was asleep when my commuter train reached the terminal, and I awoke in an empty car with all the doors locked.

Having fallen asleep at a concert, a man finds that he is locked within an auditorium that has five doors. Each door has two or more locks. He looks around and finds five key rings marked "Auditorium" hanging from hooks on a wall backstage. The set of rings holds all the keys, without duplication, to all the locks on all the doors, but the locks and doors are not identified on the keys. All locks and keys are unique. Each ring has at least one key to the locks of two different doors. No two rings carry keys for the same two doors.

What is the smallest number of key rings he must use to get out of the auditorium?

M/A 3. A puzzle report from Nob Yoshigahara contains the following problem from Kotani with an extension by Donald Knuth.

Consider a bug at a corner of a $1 \times 1 \times 2$ solid. Clearly, the farthest-away point is the diagonally opposite corner, if the bug can travel through the solid. But our bug is restricted to the surface of the solid (vertices, edges, and faces). What point is the farthest away? The extended problem is to find two points that are maximally far apart for the bug.

SPEED DEPARTMENT

A quickie from Robert Ackerberg.

To get to work each morning, a wealthy MIT business school graduate is driven to a ferry by his chauffeur. When the man returns from work in the late afternoon, the chauffeur leaves the house at exactly the right time to meet the ferry as it docks. One day, the man decides to take a ferry that arrives exactly one hour earlier than his usual ferry. When the ferry docks, his chauffeur is not there, and he begins to walk home. Eventually, the chauffeur meets him on the road and drives him back to the house, where they arrive 15 minutes earlier than usual. How many minutes was the man walking along the road?

SOLUTIONS

N/D 1. We start with a bridge problem from Larry Kells, who wants to know the best chance of making seven spades for a partnership that holds

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

You are South, the declarer, and the opening lead is a spade, with East following suit. Assume that there are no inferences to be had from the bidding or the lead, and that the opponents will make no mistakes for the rest of the play.

Most responders agree that there are two possible lines with nearly the same likelihood of success. The following response is from Jorgen Harmse.

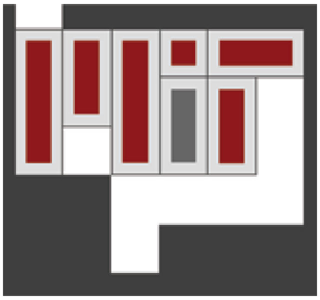
"Once the lead is in dummy, declarer must draw trump and play diamonds. The question is whether to cash hearts first. I assume that East's card on trick one is uninformative; the 7, for example, does not suggest a singleton. Cashing one or two hearts does not help to make the contract, and the probability of a favorable diamond split is slightly higher than the probability that three hearts can be cashed. Declarer should nevertheless try to cash three hearts: if East ruffs, then declarer can overruff, draw trump, and try diamonds. (If hearts are not ruffed, then declarer ruffs a club, draws trump, and plays the top diamonds.)" Harmse furnished a detailed analysis of the probabilities involved, which can be found on the Puzzle Corner website, cs.nyu.edu/~gottlieb/tr.

N/D 2. The MIT logo has always reminded David Hagen of a slider puzzle. He wants you to slide the tiles in the figure at right so that the gray *I* escapes (at the top left, the only exit) without ever entering the black area. (Hagen believes that if the colors of the tiles had been reversed, we would have had an ocular-medication problem: getting the red "I" out. Sorry.) As a bonus, Hagen sent us a Word document (OpenOffice will also open it) in which you can actually slide the pieces and try to find the solution.

Brad Edelman sent us a textual solution and also a pointer to a Web-hosted animated solution. Those of you able to view Flash 9 animations should point your browser to either Brad's site, brad.edelman.googlepages.com/mitslider.html, or the Puzzle Corner website and enjoy. The textual solution follows.

"Number the sliding pieces 0 to 6 from left to right, with pieces in the same column numbered sequentially, from top to bottom."

2—down, down
4—down
6—right
3—down, right, down, down
1—right, right
2—up, up, left
4—left, down
3—left
1—down, right, down
2—right, right
4—up, up
3—left
2—down
5—left
6—up
1—right
2—right
3—right
4—right
0—right, right, down, down
5—left, left, left, down, down
4—up, left, left, left, up



N/D 3. Rocco Giovanniello extends his 3-D tetrahedral game, which appeared five years ago. Consider five equilateral triangles with side lengths five, four, three, two, and one, so that the largest triangle is the base of an equilateral tetrahedron, and the other three are parallel cross sections. On the five triangles, place sets of 15, 10, 6, and 3 winks and 1 wink in the natural way. The base now looks like

w
w w
w w w
w w w w
w w w w w

and the smaller triangles look the same, but with one or more bottom rows deleted. Remove the lone wink from the top triangle (leaving 34 winks in the tetrahedron) and play a checkers-like game in which a move consists of one wink's jumping over an adjacent wink and landing on a blank space, the jumped wink being removed. Since the number of winks decreases by one with each move, the longest possible sequence of jumps is 33. Can you find such a sequence?

Glenn Iba sent his "thanks to Rocco ... for a fun puzzle" and sent the following solution for us all. First, number the positions of the tetrahedron as follows:

35	32	26
	33 34	27 28
		29 30 31
		etc.

The starting configuration has position 35 empty and the rest filled. Iba uses the notation $A \rightarrow B$ (C) to mean the wink in A moves to the empty space B, and the wink in C is removed.

1. 31 → 35 (34)
2. 29 → 31 (30)
3. 35 → 29 (33)
4. 25 → 34 (31)
5. 26 → 31 (28)
6. 34 → 25 (31)
7. 29 → 26 (27)
8. 7 → 27 (19)
9. 16 → 19 (17)
10. 22 → 17 (19)
11. 32 → 16 (26)
12. 16 → 19 (17)
13. 27 → 7 (19)
14. 15 → 31 (25)
15. 18 → 25 (21)
16. 31 → 15 (25)
17. 5 → 30 (20)
18. 13 → 31 (24)
19. 31 → 29 (30)
20. 29 → 13 (23)

At this point, all remaining winks are in the bottom layer, which is filled, except that position 5 is empty. The remaining moves are a solution to this 2-D triangle version of the puzzle.

21. 14 → 5 (9)
22. 7 → 9 (8)
23. 3 → 8 (5)
24. 10 → 3 (6)
25. 1 → 6 (3)
26. 2 → 7 (4)
27. 11 → 4 (7)
28. 12 → 14 (13)
29. 6 → 13 (9)
30. 14 → 12 (13)
31. 4 → 13 (8)
32. 12 → 14 (13)
33. 15 → 13 (14)

BETTER LATE THAN NEVER

J/A 3. Eugene Sard believes that the solutions should subtract the area of the silo. A "farmer boy," who wishes to remain anonymous, has "observed that a goat, staked on a chain in an open field, will eat grass in only one direction ... spiraling in until it literally can no longer move."

OTHER RESPONDERS

Responses have also been received from F. Albisu, D. Barber, J. Chandler, W. Cluett, T. Coradetti, B. Edelman, J. Goodman, L. Iori, W. Kingery, N. Markovitz, Z. Moledina, G. Perry, N. Peters, J. Rudy, J. Savitzky, M. Schatz, D. Wachsman, G. Weatherby, and F. Wilmington.

PROPOSER'S SOLUTION TO SPEED PROBLEM

Imagine you are the chauffeur. If you arrived at the house 15 minutes earlier than usual, you must have been 7.5 minutes from the dock when you met up with your employer, because if you had driven 7.5 minutes to the dock and 7.5 minutes back to the place where you met your employer, you would have arrived home at the same time as usual. Therefore, your employer must have been walking for 52.5 minutes (60 – 7.5 = 52.5), because if you had driven all the way to the dock in 7.5 minutes, you would have arrived an hour after the early ferry got in. ■

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