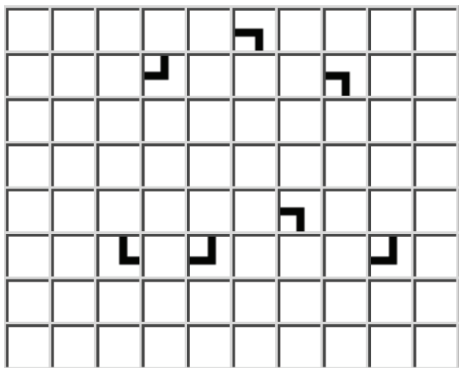
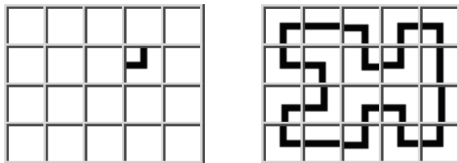


It has been a year since I specified the size of the backlogs for the various kinds of problems that are printed. Currently, I have a large queue of regular problems and a comfortable supply of game (bridge, chess, etc.) and speed problems.

Problems

M/J 1. Here is another puzzle from Frank Rubin’s SumSum Puzzle website, sumsumpuzzle.com. Frank calls these puzzles Coralines (for *corners* and *lines*). It is a corner puzzle for Puzzle Corner. The object is to draw a continuous path through all the boxes in the puzzle grid using only horizontal and vertical lines. That is, you draw your path by putting either a horizontal or vertical line character or one of the four possible box corners into each box. You can solve these puzzles purely by logic, with no guesswork needed.

The first two diagrams below show a 4-by-5 Coraline and its unique solution. If you have difficulty getting this solution, you should look at the Tips and Tricks section of the SumSum Puzzle website. The larger third diagram is the 8-by-10 Coraline that constitutes our first problem for this issue.



M/J 2. Fred Tydeman owns N pairs of socks, each pair a different color, which he washes when all of them are dirty. When the washing and drying are complete, he uses the following algorithm for sorting and storing the socks. Tydeman first brings the entire basket of clean socks up to the bedroom, removes one sock, and lays it on the bed. He then removes another sock at random.

If the new sock matches any on the bed (initially there is only one there), he folds the pair and places it in a drawer. If there is

no match, the new sock is placed on the bed and another sock is taken from the basket, again at random.

Tydeman repeats the procedure until all the socks are matched and records the maximum number of unmatched socks on the bed. He would like to know the expected value of this maximum in terms of N . He also asks for the expected value when $N = 10$ and $N = 20$.

M/J 3. Gerald Giesecke has a solid whose cross-section perpendicular to the height is a regular polygon with s sides. If he bends this solid around so that its top and bottom ends meet, the result is a (solid) torus with essentially the same regular polygon as its cross-section. If we treat as edges the formerly vertical lines that include the cross-sections’ vertices, the solid has s surfaces and s edges.

If one end of the initial solid is twisted before the top and bottom ends are joined, a Mobius-like solid is formed, and Giesecke asks how many surfaces this solid has. The answer should be given in terms of s and t , where t is the number of segments that are passed in the twisting process. For example, a twist with $t = 1$ represents a twist of $360/s$ degrees and a twist with $t = 2$ represents a twist of $720/s$ degrees.

Speed Department

Sorab Vatcha wants to know the area of the hexagram (the Star of David, or Solomon’s Seal) formed from two unit-length equilateral triangles. He also asks for the radius of its circumscribed circle.



Solutions

J/F 1. Another bridge problem from the near-infinite well named Larry Kells.

Specify North-South cards with the following property, always assuming best play and a fixed-suit contract with South as declarer: the difference between the number of tricks taken with the most favorable opposing distribution and the number taken with the least favorable opposing distribution is maximized.

I must apologize for not catching an error introduced during proofreading in the January/February issue. The first sentence of the problem should have been as I have it above. I was trying to give Larry credit for offering so many bridge problems. However, the wording was changed to “almost infinitely well-named,” suggesting something about Larry’s name.

After publication, I received an e-mail asking for the relation between either the name “Larry” or “Kells” and the stated problem. To repeat, I apologize for the simple “grammatical” error, and I hope no offense was taken.

The solution with the largest difference is from Kells himself. As we shall see, very little is changed between the best and worst distributions. In both cases, the North-South holding is the same and they are in a spade contract. The worst distribution for North-South is

North
 ♠ 6 5 4 3
 ♥ 10 9 8 7 6
 ♦ 9 8 7 6
 ♣ void

West
 ♠ A K Q J
 ♥ void
 ♦ void
 ♣ A K Q J 10 9 8 7 6

East
 ♠ 2
 ♥ 5 4 3 2
 ♦ 5 4 3 2
 ♣ 5 4 3 2

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

With this distribution, West simply draws trumps and then cashes the clubs, taking all 13 tricks.

Now swap the spade J and club 5, giving

North
 ♠ 6 5 4 3
 ♥ 10 9 8 7 6
 ♦ 9 8 7 6
 ♣ void

West
 ♠ A K Q
 ♥ void
 ♦ void
 ♣ A K Q J 10 9 8 7 6 5

East
 ♠ J 2
 ♥ 5 4 3 2
 ♦ 5 4 a3 2
 ♣ 4 3 2

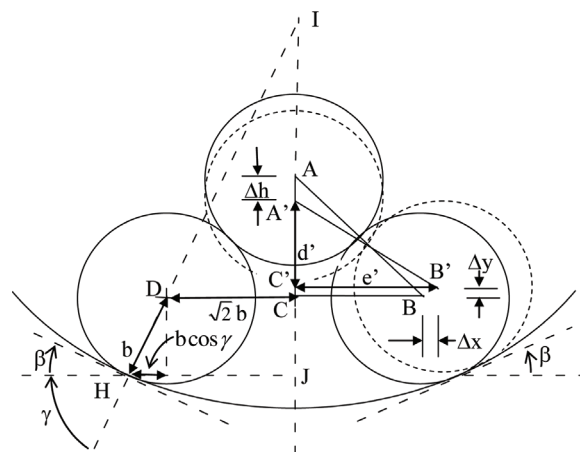
South
 ♠ 10 9 8 7
 ♥ A K Q J
 ♦ A K Q J 10
 ♣ void

Surprise! South can make four spades. Kells writes, “It can easily be verified that now it never does West any good to lead a spade. His best defensive strategy is a forcing game in clubs, hoping declarer will lose control. Ruff the first club in dummy and play a spade to West. Ruff the second club in dummy and play another spade to West. (This draws East’s trumps.) Ruff the third club in your hand and play the red-suit winners. West can ruff in with his last trump, but you still have a trump left

to keep control. All West gets are his three trumps, a 10-trick difference from the first distribution.”

J/F 2. Philip Cassady has four spheres of radius b resting in contact at the bottom of a spherical bowl of radius a , their four centers being at the corners of a horizontal square. A fifth identical sphere is placed upon them. What conditions on the relationship between a and b are required for each sphere to be in equilibrium under the action of its weight and the reactions of the bowl and the other spheres? Regard all contacts as smooth with no friction.

I received several lovely solutions with beautiful diagrams. It was difficult to choose just one, but I finally decided on the following excellent response from Tim and Ruth Barrows.



Better Late Than Never

Y2012. John Chandler, Ermanno Signorelli, and William Stein found the following improvements.

$$\begin{aligned}
 2 &= 2 + 0 \times 12 \\
 4 &= (10 - 2)/2 \\
 9 &= 10 - 2/2 \\
 14 &= 2 + 0 + 12 \\
 24 &= (2 + 0) \times 12 \\
 41 &= 20 + 21
 \end{aligned}$$

Other Responders

Responses have also been received from R. Anderson, R. Bird, P. Kramer, B. Kulp, W. Lemnios, R. Lipes, N. Markovitz, R. Schweiker, D. Sidney, J. Simmonds, E. Staples, G. Starkeson, and T. Terwilliger.

Proposer’s Solution to Speed Problem

Both are $1/\sqrt{3}$.

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.