The end of an era has arrived. After 50 years of college teaching, the last 42 at NYU, I shall officially retire on September 1, 2022. After all this time as a professor, it seems strange to realize that I will have no more lectures to prepare or recommendations to write, and (thankfully) no more exams to grade. I have enjoyed the ride, but it is time to pass the torch to my younger colleagues.

Send problems, solutions, and comments to Allan Gottlieb at MIT Technology Review, 196 Broadway, Cambridge, MA 02139 or gottlieb@nyu.edu. For other solutions and back issues, visit the Puzzle Corner website at cs.nyu.edu/~gottlieb/tr.

Puzzle corner

Problems

J/A1. Lawrence Kells picks up his cards and finds KQJ of spades, KQJ of hearts, AKQ of diamonds, and AKQJ of clubs. He wonders if 5 no-trump is always possible to make or if there is a distribution of the cards for the remaining three hands that limits him to 4 no-trump assuming perfect double-dummy play.

J/A2. Greg Muldowney sent us the following problem, which had me completely baffled until he explained that it is a double reverse cryptogram: “each digit represents a letter, and the words state an arithmetic equation that would typically be written with numbers.”

J/A3. Our final regular problem, from Ermanno Signorelli, features a one-inch-diameter disk that rotates without slipping inside a 30-inch-diameter ring. How many revolutions does the smaller disk undergo while traveling from its initial position back to that same position?

Solutions

M/A1. If you know the “Red King” bridge problem, our first offering, from Richard Thornton, will seem familiar (but not the same).

Jane, South, opens 2 no-trump and Dick, North, bids 6 no-trump. Jane sees that they have all the aces, queens, jacks, and 10s, but no kings. She can finesse East and West up to twice each and can make the contract if she can win two out of three finesses. Jane plans her play to have the highest probability of making the contract and succeeds. Before any card is played, what is the probability of her making 6 no-trump, and in what sequence did she make her finesses? Thornton offers as a hint that you do not need to know distribution probabilities to solve this problem.

John Chandler writes that a finesse will win if and only if the king in question is held by the opponent sitting to the right of the defender who has the ace. Given that the description of the bidding implies that both opponents simply passed, I think the odds of favorable placement of each king are 50-50, and so the probability of winning two is 1/4.

M/A2. Another of Dick Hess’s “logical hat problems,” in which logicians each wear a hat with a number and can see every number but their own. All the logicians know that they are error-free in their reasoning. You are to figure out what numbers are on their hats.

Here, two positive odd integers are chosen that are either the same or separated by two. The larger (if any) is written on B’s hat and the other on A’s hat. The logicians make these statements in order.

A1: “I don’t know my number.”
B1: “I don’t know my number.” …
A9: “I don’t know my number.”
B9: “I now know my number.”
The following solution is from Carol Ouellette.

The key is to realize that as each player announces that they don’t know their number, an additional possible solution is eliminated. When A1 doesn’t know their number, this eliminates the solution (2,2), since if B were 2, A would know it must also be 2. When B1 doesn’t know their number, this eliminates the solution (2,4), since if A were 2 with (2,2) already eliminated, B would know it must be 4. This continues at each turn, where statement An (n = 1:9) eliminates the solution (2n, 2n) and statement Bn (n = 1:8) eliminates the solution (2n, 2n + 1).

Eliminated solutions:

<table>
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<td>10</td>
<td>10:54</td>
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<td>11</td>
<td>11:60</td>
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</tbody>
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2021 S/O1. Dana Johnson notes that after White’s move 2 of WR to c7, WR is now blocking WB protection of WN, so Black’s move 2 is BK x WN. Johnson believes the correct answer is WN to b7. Then Black has five choices:

1. BB x WP, in which case White’s move 2 is WR to d8 checkmate.
2. BB to a6, in which case White’s move 2 is also WR to d8 checkmate.
3. BR x BB, in which case White’s move 2 is still WR to d8 checkmate.
4. BN x WP, in which case White’s move 2 is WN x WR checkmate.
5. Any other Black move, in which case White’s move 2 is WP x WN checkmate.

Better late than never

M/A3 J. D. Kramer asks you to show that the angle measured clockwise from the hour hand to the minute hand in an analog clock takes on a specific value 0 < A < 360° 11 times in every 12 hours.

The following solution is from F. G. Schmidt.

Without loss of generality, we start observing the clock at time \( T_0 = 00:00 \), when both hands overlap and angle \( A = 0° \). As the minute hand moves through an angle \( m \), the hour hand moves through an angle \( h = m/12 \), so that angle \( A = m - h = 11m/12 \). When first \( A = 360° \), \( h = m/12 = (12A/11)/12 = A/11 = 360°/11 = (328/11)° = 32°.72° \) and \( m = 12h = 392.72° \). Since the minute hand moves 6° during each minute, after \( T_1 \), both hands next overlap \( M = 65.73 \) minutes later, corresponding to time \( T_1 = 01:05.05/11 = 01:05.45 \), when again \( A = 0° \). Thus, both hands overlap at consecutive times \( T_k \), where \( T_k = T_{k-1} + M \) and \( T_{11} = 12:00 \), as shown in the table below. Thus, the times when \( A \) has a given value in the interval \( 0° < A < 360° \) occur in the intervals \( \langle T_{k-1}, T_k \rangle \) for consecutive integer values of \( k \), of which there are 11 for \( 1 \leq k \leq 11 \).

Solution to speed problem

“Queue.”