Roving Riverward

Since this is the first issue of a new academic year, I once more review the ground rules under which this department is conducted.

In each issue I present three regular problems (the first of which is chess, bridge, go, or computer-related) and one “speed” problem. Readers are invited to submit solutions to the regular problems, and three issues later, one submitted solution is printed for each problem; I also list other readers who responded. For example, solutions to the problems you see below will appear in the February/March issue and this issue contains solutions to the problems posed in May/June. Since I must submit the February/March column in November, you should send your solutions to me during the next few weeks. Late solutions, as well as comments on published solutions, are acknowledged in subsequent issues in the “Other Respondents’” section. Major corrections or additions to published solutions are sometimes printed in the “Better Late Than Never” section.

For speed problems the procedure is quite different. Often whimsical, these problems should not be taken too seriously. If the proposer submits a solution with the problem, that solution appears at the end of the same column in which the problem is published. For example, the solution to this issue’s speed problem is given below. Only rarely are comments on speed problems published.

There is also an annual problem, published in the January issue of each year, and sometimes I go back into history to republish problems that remained unsolved after their first appearance.

Problems

OCT 1. We begin with a Bridge problem from J. Harmsen who notes that the highest possible declarer score is obtained by playing NT redoubled vulnerable making all 13 tricks. The problem is to devise a distribution of the cards in which the above occurs with “normal” bidding and play.

OCT 2. The following problem is from Robert Sackheim. A is 73 feet from a straight river, and B is on the same side of the river but not so far from it. M and N are the points on the river nearest to A and B respectively. The length of AB, MN and BN are whole numbers of feet. Joan walks from A to B via the river (i.e., at one point she is at the river), taking the shortest possible route, and this is also a whole number of feet. How far does she walk? What is the direct distance from A to B?

OCT 3. Richard Hess entitles one of the “Missing term” and writes: Given the series

...35, 45, 60, x, 120, 180, 280, 450, 744, 1260,...

the problem is to find a simple continuous function to generate the series and from it to determine the surprise answer for x.

Speed Department

There are 13 diamond cards in a card deck. How many diamonds are on those 13 cards?

Solutions

MJJ 1. We begin with a Bridge problem that Winslow Hartford sent us from the London Sunday Observer. In the hand shown, West missed the killing diamond opener against 7H and instead led the spade jack. How can South now make the grand slam?

MJJ 2. Gordon Rice is thinking of four positive integers

0 < A < B < C < D

that have a curious property. When numbers are written in base D

AB = Ab(10)

and

BA = B(10)

For what values of D do solutions exist? Are they unique? Note that AB does not represent AxB. Instead it signifies juxtaposition, e.g., if A=24 and B=345, AB = 2345.

Robert High write: Gordon Rice’s relationship is far from unique; I found 7268 solutions with D=100 and 98 with D=200. Since 0 < A < B < C < D, the conditions boil down to the simultaneous congruences

A+D = B mod C
B+D = A mod C

(The fact that A and B are “written in base D” is really irrelevant.)

A little manipulation leads to the conclusion that these conditions are satisfied if and only if we can find A < B < C < D such that

(B+D)A is divisible by C
and
(B+D)A is divisible by C

These conditions are satisfied by many families of quadruples; a simple three-parameter family is

C = B+2A
D = C+2

but there are many other solutions as well, such as (1,7,12,18) or (13,20,21,98).

As noted by Richard Hess, it is easy to see that no solutions exist for D=5; unique solutions exist for D=6 and D=6, and many solutions exist for every D=6.

MJJ 3. Daniel Morgan wants to know the expected point count for a randomly dealt Bridge hand of 13 cards? High cards are valued as Aces=4, Kings=3, Queens=2, and Jacks=1. In addition a void (no cards in a suit) contributes 3 points, a singleton contributes 2, and a doubleton contributes 1.

Stephen Janovsky sent a solution involving fairly little calculation (i.e., a computer was not required). He uses the notation E0 for expected value, P0 for probability and # for “number of” and writes:

The expected high card value of a bridge hand is easily determined using the additivity of expected values:

\[ E(\text{aces}) = 4 \times E(\text{voids}) = 4 \times (13) \times E(\text{value}) = 4 \times 1 = 4. \]

Thus

\[ E(\text{high card pts}) = 4 \times 3 + 2 \times 1 = 10. \]

\[ E(\text{void pts}) = 3 \times E(\text{voids}) = 3 \times (13) \times E(\text{value}) = 3 \times 1 = 3. \]

\[ E(\text{singleton pts}) = 2 \times E(\text{singleton}) = 2 \times 13 = 26. \]

Continued on Page MIT 54


Continued from Page MIT 55
(214) (13/9 choose 12 / 92 choose 13)
E(doublenets p) = 4 (1/p-edge doublenets) = (4) (13 choose 12)/9 (choose 11) / 92 choose 13

Combining the above, E(distribution p) = (193/290131)3371299 / (23341/4347549) 1 = -1.61748
So E(p^2) = -1.61748

Robert High assumes that the proposer “DANIEL MORGAN is your MAIN GOREN LAD,” which just goes to show what happens when you start hanging out with Nob. Yoshigahara.

Better Late Than Never
MJ I. Darold Rabarch and George Blondin noticed that numbers ending in one were inadvertently omitted. For example, the fourth n with F(n,n) = (n-1)^n is “two hundred one.” There are 95, not 64 solutions as previously claimed.

SD: I really do not normally include comments on speed problems but quite a ruckus has occurred regarding the minimum number of pitches in a complete baseball game and the number of calls by the first place umpire. I somehow cannot resist printing the following from Tony Carpentieri but will try hard to refrain from speed problem follow-ups in the future.

"I disagree on the number of pitches/plate umpire calls in a complete game. There are things that a pitcher can do, such as (I believe) touching his tongue to his pitching hand that result in one ball being called. So, each inning goes like this: Pitcher licks hand (or other stuff) 12 times in a row. All calls made by field umpires. He then picks off the three runners, with calls naturally made by field umpires. Well, this goes on for a bunch of half innings, let’s say 17. Then a pitcher licks his hand 16 times, and walks a run home in the bottom of any inning after 8. Pitches: 0, plate umpire calls: 0.*"

In addition, Joseph Gurland tells me that our problem as it was printed in rec: sport:baseball, a popular electronic newsgroup. Gurland sent copies of several other no-pitch solutions found by newsgroup readers.

Other Responders

Proposer’s Solution to Speed Problem
81. Each of the 13 cards has a diamond in the upper left corner and one in the lower right corner, for a total of 26. The Jack, Queen, and King have no other diamonds on them. The Ace through 10 have 1+2+3+4+5+7+8+9+10+55 additional diamonds.