PUZZLE CORNER

ALLAN J. GOTTLIEB, '67

The Travel Bug

I am pleased to report that you may notice a familiar problem in one of the new Prentice-Hall catalogues. Bill Zobrist from P-H decided to run one of our "Puzzle Corner" problems. Other than that it has been a pretty quiet month, especially when compared with my "close encounter" with Hurricane Andrew.

Problems

F/M 1. We begin with a Bridge problem from Jerry Grossman who writes: Here's a cute bridge problem that you might want to consider for *TR*. It arose (well, except for one card that I changed to make it more interesting) in a Swiss team game last weekend at the Southeast Michigan Valentine's Sectional.

North
♠ 4
♥ A J 5
♦ A K J 7 2
♣ A 8 5 2

West
♠ 9 7 6 5
♥ 5 3 2
♦ 8
♣ J 10 7 6 3

East
♠ 3
♥ K Q 9 8 6
♦ Q 10 9 4
♣ K 9 4

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

The contract is six spades by South, East having bid hearts (overcalled North's diamond opening bid). How is the contract made against any lead? This is not a double dummy problem, so the play should make bridge sense.

F/M 2. Our next problem is Tom Hansen's first submission, a true-to-life story illustrating that "biology students should learn their physics."

A scientist at a Boston-area biotech company needs to centrifuge 5 identical samples. He has available 3 centrifuges with capacities of 6, 8, and 12 samples. Can he use any of these centrifuges to prepare the 5 samples together, without adding another sample or making the centrifuge unbalanced?

F/M 3. Walter Cluett asks one that sounds very familiar to me. Who knows but maybe it was in "Puzzle Corner" some 20 odd years ago.

Four bugs are standing on the corners of a square surface 1.414 feet on a side. Simultaneously, each starts walking at the same rate directly, and always directly, toward the bug on its right. Eventually they all meet. How far did each bug travel?

Speed Department

Speedy Jim Landau wants to know how you can drop a raw egg 4 feet without it breaking.

Solutions

OCT 1. We begin with a Bridge problem from J. Harmse who notes that the highest possible declarer score is obtained by playing 1NT 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.

The following solution is from Robert Sackheim:

North
♠ x x x
♥ x x
♦ A Q 10 x x x
♣ x x

West
♠ K J x x
♥ K Q J x
♦ K J
♣ x x x

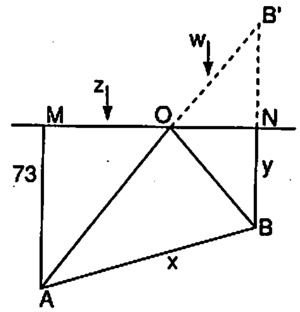
East
♠ Q x x
♥ x x x x
♦ x x x
♣ K J x

South
♠ A x x
♥ A x x
♦ x x
♣ A Q 10 x x

South	West	North	East
1 C	Dbl	1 D	Pass
1 NT	Dbl	Pass	Pass
Redbl	Pass	Pass	Pass

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?

A fine solution from Howard Stern:



Referring to the diagram above, reflect B across MN to B'. The length of the shortest path from A to B, touching the river MN at O, is the same as the length of the segment AB'. Let the small letters represent the integral lengths of the following segments:

x=AB y=BN z=MN w=AB'

By the Pythagorean theorem we have the following relationships:

$$z^2+(73-y)^2=x^2$$
$$z^2+(73+y)^2=w^2$$

Also, since point B is closer to the river (MN) than A, we have the inequality $0<y<73$.

The above conditions imply a Diophantine set of equations. Because of the limits on y, there are only a finite number of Pythagorean triplets that must be checked.

The Pythagorean triplets can be generated from two integers m,n as follows: $\{m^2-n^2\}$, $\{2mn\}$, $\{m^2+n^2\}$, and all integer multiples thereof.

The only solution found is z=120, x=123, w=169, and y=46. Thus, A and B are 123 feet apart, and the distance walked is 169 feet.

OCT 3. Richard Hess entitles this one "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.

Rick Hedrick, Eugene Sard, and Kelly Woods found the unique 8th degree polynomial passing through the nine given points and deduced that x is approximately 83. The proposer Richard Hess intended that

$$f(n) = \frac{2^n-1}{n} \cdot 120 \quad (n \neq 0)$$

$$x = \lim_{n \to 0} f(n) = 120\ln 2$$

Which one is the "simpler," I leave to you.

Other Responders

Responses have also been received from B. Blondin, S. Feldman, M. Fountain, P. Godfrey, R. Hess, J. Keilin, M. Lively, A. Lowenstein, D. Schwarzkopf, and K. Rosato.

Proposer's Solution to Speed Problem

Drop it 5 feet; it will not break during the first four.

SEND PROBLEMS, SOLUTIONS, AND COMMENTS TO ALLAN J. GOTTLIEB, '67, THE COURANT INSTITUTE, NEW YORK UNIVERSITY, 251 MERCER ST., NEW YORK, N.Y. 10012, OR TO: GOTTLIEB@NYU.EDU