Puzzle Corner

INTRODUCTION

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 multiyear supply of regular problems and more than a year of speed problems. Bridge problems, however, are in short supply. Computer, chess and go problems are now considered regular problems.

PROBLEMS

M/A 1. Larry Kells continues the saga of the fighting bridge partnership.

I saw the husband who had been henpecked by his wife for making unsound doubles, until she was victimized herself. I asked him why they weren't coming to the club anymore. He told me they had decided to try duplicate bridge instead. They figured, if they were cursed to be continually dealt powerful hands which then couldn't defeat opposing contracts, at least they would share their misery with other players playing the same deals. But then a hand came up that renewed all the old tensions.

They had bid to a cold, vulnerable six-spades contract that no other pair reached. But then the opponents sacrificed—nonvulnerable—at seven spades (!) and, despite a 12-trick set, left our couple with a bottom on the board. "We got 600 points, but everyone else with our cards either bid four spades and made six, or 3NT and made four or five, for 630-680 points," he said.

"Why on earth didn't you double them?"

"We had made a compact in blood that neither of us would ever again double for penalties unless the doubler held the cards in his or her own hand that would give us an ironclad guarantee of defeating them. Neither of us could single-handedly guarantee that they wouldn't make seven spades. So we couldn't double."

"Didn't one of you have the ace of spades?"

"No, that was our only loser."

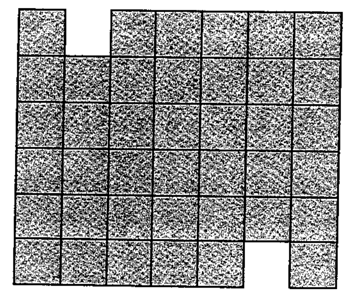
"But why under heaven did they sacrifice in your suit?"

"Apparently one of them overheard us discussing our blood compact and knew that we would not double seven spades. If they had sacrificed at seven in some other suit, we would have doubled because one of us had the ace of that suit, and if they had sacrificed at 6NT, either of us could take several winners off the top, so we could have safely doubled them."

Can you reconstruct the deal?

M/A 2. A seasonal problem from Larry Kells: We know that as the seasons progress, the sun appears to move first north, then south of the equator. Thus, first one hemisphere, then the other, receives a larger amount of daily solar radiation. But clearly, if the sun is just barely north of the equator, then the North Pole—with the sun barely above the horizon all 24 hours—will not receive as much energy per day as a point just south of the equator, where the sun still climbs nearly overhead. The problem is this: How far north of the equator does the sun have to be in order for *every* point in the northern hemisphere to receive more energy per day than *every* point in the southern hemisphere? (Note that the amount of energy received from the sun per unit of time is proportional to the sine of the altitude of the sun above the horizon when it is up, zero when it is down.)

M/A 3. Our last regular problem is from Solomon Golomb's column entitled "Golomb's Gambits" that appeared in the *Johns Hopkins Magazine*. How can you dissect this figure into four congruent pieces?



SPEED DEPARTMENT

Warren Himmelberger wants you to find the next number in the sequence:

10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 23, 25....

SOLUTIONS

N/D 1. We begin with a bridge problem from Larry Kells who describes a "curious result in team-of-four bridge play" as follows. I was attending a team-of-four bridge tournament when I heard of the following curious results on a particular hand: At one table the contract was three spades doubled by South, made. At the other (using the exact same cards in each position), it was three spades doubled by East, made! I asked a member of the losing team how they managed to have three spades made against them in both directions. She diagrammed the deal and showed me how it was played at both tables; amazingly none of the defenders had made a mistake in play! Unfortunately I've lost the diagram. Can somebody restore it for me?

The following solution is from Robert Sackheim.

Contract: Three spades played by S. W must lead a red card. S takes dummy's AK of hearts and AK of diamonds, discarding four clubs from the closed hand. S then plays the heart or diamond Q from dummy, discarding S's last club, leaving S with nothing but spades. It does not make any difference whether E trumps or not; E gets four top spades at will, but that is all. S takes the rest of spades, fulfilling the contract.

Contract: Three spades played by E. S must lead a black card. E takes the first nine top tricks in spades and clubs to make the contract. S gets only the four spades left at the end.

West	North	East	South
♠ Void	♠ x	♠ AKQJ	♠ 10xxxxxxx
♥ 10xxxxxx	♥ AKQJ	♥ xx	♥ Void
♦ J10xxxx	♦ AKQxx	♦ xx	♦ Void
♣ Void	♣ xxx	♣ AKQJ10	♣ xxxxx

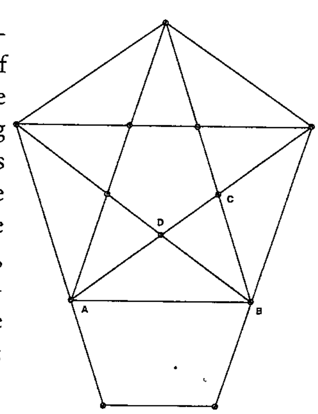
N/D 2. Paul Heckart sent us the following problem that he, Lars Sjodahl and a third MIT student worked in 1932 or '33 in Walker Memorial. If I remember correctly, that is the building where group "freshman exams" were given during my first year (1967-68).

Draw a regular five-point star. Draw a circle through the five points. Now notice that the lines connecting alternate points intersect in a pentagon. Draw a second circle circumscribing this pentagon. It will have the same center as the first circle. Finally, draw a third circle that passes through two of the points of the star and the common center of the other two circles. This third circle is median in size from the other two. Show that the radius of the first circle is the sum of the radii of the second and third circles, if possible using onle straight edge and compass.

Lester Senechal, in addition to supplying the solution reprinted below, added to my Walker Memorial history by noting that before 1955 Walker was the student activity center and also housed an infamous dining hall that was blamed for many miseries of the stomach and intestines. He himself lay for a week in the infirmary and had i.v. tubes attached for several days subsequent to having taken lunch in Walker.

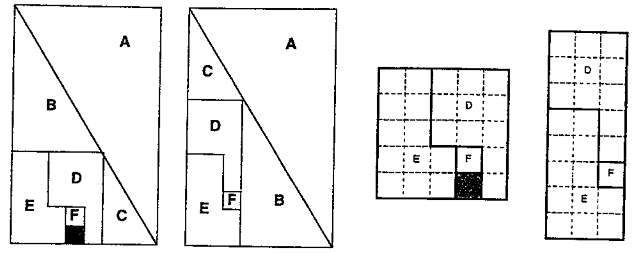
It is easily seen by considering subtended arcs of inscribed angles plus some simple bookkeeping involving angles in triangles and angles summing to a straight angle (180^o) that all angles in the diagram are multiples of 36^o, so that in particular the triangle ABC is isosceles and the angle ADB is 108^o. Therefore:

$$|AD| + |DC| = |AB|$$



and the points A, D and B are consecutive vertices of a pentagon. The circles mentioned in the statement of the problem are the circumscribed circles for the three pentagons shown above and thus have radii proportional to the respective side lengths. The result claimed in the problem statement then follows from the displayed equality.

N/D 3. Ken Rosata is puzzled by the following two diagrams he saw in *Gaming Theory* while in Las Vegas. What happened to the blank square in the first figure?



Jonathan Hardis located the discrepancy and even illustrated its cause, 3/5 is not the same as 5/8. [Golden mean anyone?—ed.]

Area A is a quadrilateral, not a triangle, and its area differs in the two figures by the area of the shaded blank square. (The human eye is very forgiving of small variations over large distances. One barely notices that A's "hypotenuse" is not a straight line.) Note that the details (shown above) imply that triangle B measures 5x8 and triangle C measures 3x5. Though close, they are not similar triangles.

BETTER LATE THAN NEVER

1998 J/A 1. Bruce Layton and John McNear do not believe it was the wife's double that kept the partnership out of a cold slam.

J/A 2. Ed Sheldon was surprised I had "fear and trembling" in presenting the solution to what he considers a fairly trivial signal-processing problem. Indeed, perhaps my fear says much more about my signal-processing experience than about the problem itself. Roy Sinclair points out that when *f(t)* is not constant, it is not clear that *f* should be called the frequency of *sin(2pft)*. Instead he feels the frequency should be the derivative of *tf(t)*.

OTHER RESPONDERS

Responses have also been received from C. Balleisen, J. Burke, J. Cord, J. Dorsey, M. Fountain, K. Fox, R. Hess, C. Miller, C. Muehe, W. Peirce, K. Rosato and E. Sard.

PROPOSER'S SOLUTION TO SPEED PROBLEM

The given numbers are the representations of 17 in bases 17, 16, ..., 6. So the answer is the representation of 17 in base 5,

Send problems, solutions and comments to: Allan Gottlieb, New York University, 715 Broadway, 10th floor, New York, NY 10012, or to gottlieb@nyu.edu.

Edited by Owen W. Ozier '98