PuzzleCorner

It has been a year since I reviewed the criteria used to select solutions for publication. Let me do so now. As responses to problems arrive, they are simply put together in neat piles, with no regard to their date of arrival or postmark. When it is time for me to write the column in which solutions are to appear, I first weed out erroneous and illegible responses. For difficult problems, this may be enough; the most publishable solution becomes obvious. Usually, however, many responses still remain. I next try to select a solution that supplies an appropriate amount of detail and that includes a minimal number of characters that are hard to set in type. A particularly elegant solution is, of course, preferred as are contributions from correspondents whose solutions have not previously appeared. I also favor solutions that are neatly written, typed, or sent via e-mail, since these produce fewer typesetting errors.

Problems

Jul 1. John Rudy wants to know how South is to make seven spades after West leads the diamond king.

North
♠ A K Q J
♥ A x x
♦
♣ Q J 10 9 8 7

West
♠
♥
♦
♣

East
♠
♥
♦
♣

South
♠ 10 9 x x x
♥
♦ A x x x x x
♣ A K

Jul 2. Chris Svenasgaard wants you to figure out who played whom and what the scores were in each game. Note that all games are intragroup and that (W, T, L, F, A, P) = (Wins, Ties, Losses, goals For, goals Against, 2W+T).

GROUP A

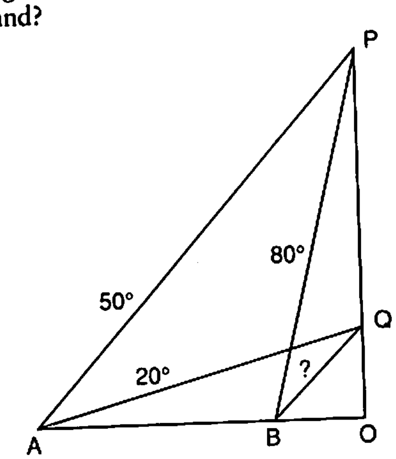
TEAM	W	T	L	F	A	P
Sampdoria	1	1	0	2	0	3
Panathinaikos	0	2	0	0	0	2
Red Star	1	0	1	3	4	2
Anderlecht	0	1	1	2	3	1

GROUP B

TEAM	W	T	L	F	A	P
Barcelona	1	1	0	3	2	3
Sparta Prague	1	0	1	4	4	2
Dynamo Kiev	1	0	1	2	2	2
Benifica	0	1	1	0	1	1

Jul 3. Gordon Stallings, after spending countless hours studying flagpoles, asks the following:

Flagpole OP has a band of paint part way up at Q. Observer A sees the top of the pole, P, at an angle of 50 degrees, and the band at an angle of 20 degrees. Observer B sees the top at an angle of 80 degrees. At what angle does B see the band?



Speed Department

Speedy Jim Landau notes that ASCAP has employees who monitor radio and TV for copyrighted songs so that royalties can be properly assigned. Why do these monitors need to know precalculus?

Solutions

F/M 1. Larry Kells offers a sequel to his N/D 1 bridge problem, where 7NT was unbeatable despite one defender having 26 points.

On a later date, in another high-stakes game, I saw the same couple defend unsuccessfully against another 7NT, redoubled and vulnerable. This time in the aftermath they argued as follows:

Husband: That was really fine of you, the way you kept criticizing me for doubling 7NT when I didn't have all four suits stopped. You just did the same thing!

Wife: But I had THIRTY points! I knew we had to be able to beat 7NT. And we would have if you had led any card other than the one you did. They would have been down TEN!! But you had to lead the one card that let them make it!

Husband: But how could I have known, when that suit was never bid?

Wife: You should have known that if you had led one of the other suits, and it turned out badly, at least they couldn't have run so many tricks in it!

Assuming they were telling the truth, reconstruct the deal.

North
♠ 10 9 8 7
♥ 10 9 8 7
♦ A 10 9 4 3
♣

West
♠ 5 4 3 2
♥ 5 4 3 2
♦ 8 7 6 5
♣ 10

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

South
♠ 6
♥ 6
♦ 2
♣ A Q 9 8 7 6 5 4 3 2

East	South	West	North
2S	Pass	2NT	Pass
3H	Pass	3S	Pass
6S	Pass	Pass	7D
DBL	RDBL	Pass	Pass
Pass			

North's 7D is a sacrifice and South figures that 7NT is no worse than 7D. The redouble is an attempt to bluff West out of leading a major suit.

With an opening lead of the 10 of clubs, South captures the king with the ace and then runs the clubs, discarding all dummy's spades and hearts and two small diamonds. If East kept one spade, one heart, and one diamond, declarer now leads to the diamond ace and dummy is high. If East kept two diamonds and a spade or heart, South now plays the good

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Puzzle

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major and East would be squeezed again.

On any other opening lead East wins eight major suit tricks and two diamonds, but either puts dummy in with a diamond or leads into South's club tenace.

East can hold no other hand. If she held three aces, there would be no possibility of a squeeze (for 13 tricks). If she held but one ace, she wouldn't have 30 points. Missing two aces, the only combinations in the aceless suits to provide 10 points are KQ, KQ; KQJ, KJ. KQ, KQ would prevent running a long suit.

A two-suit squeeze against AKQJ, AKQJ would be impossible with two losers. Therefore, a three-suit squeeze is required. Since not all the threat cards can lie in one hand, one or more must lie in dummy. For dummy to be reachable, it must contain one of the aces: in this situation, the side-suit ace. Since West must be denied any control cards for the squeeze to be effective, the rest of the layout falls into place.

F/M 2. Victor Baracas has a bunch of regular n-gons (prizes from winning the gon show?) and asks, "If a regular n-gon has area A and perimeter P, express the ratio $P^2/4A$ as a function and find the limit as n approaches infinity.

Ed Kaplan notes that a regular n-gon is comprised of n isosceles triangles arranged pizza style! Place the n-gon such that it is sitting on one of these triangles; the interior angle at the top of the isosceles triangle equals $2\pi/n$. Let the length of the isosceles side(s) equal r. Then the base of the triangle will equal $2r\sin(\pi/n)$ while the area of the triangle will equal

$$r^2\sin(\pi/n)\cos(\pi/n)$$

(for the height of the triangle is $\cos(\pi/n)$), and hence the perimeter of the n-gon is given by

$$P = 2rn\sin(\pi/n)$$

while the area of the n-gon is given by

$$A = nr^2\sin(\pi/n)\cos(\pi/n).$$

Letting f(n) denote the ratio $P^2/(4A)$ in the problem, we have

$$f(n) = (2rn\sin(\pi/n))^2/(4r^2n\sin(\pi/n)\cos(\pi/n))$$
$$= n\sin(\pi/n)/\cos(\pi/n) = n\tan(\pi/n)$$

As $n\to\infty$, $\cos(\pi/n)\to 1$ while $n\sin(\pi/n)\to\pi$ (using L'Hopital's rule), so we see that $f(n)\to\pi$ as $n\to\infty$.

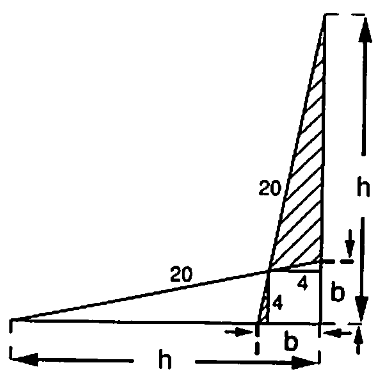
As a check, we know that as $n\to\infty$, the n-gon becomes a circle. For a circle with radius r, we have $P=2\pi r$ and $A=\pi r^2$ and as a consequence

$$f(\infty) = (2\pi r)^2/(4\pi r^2) = \pi$$

verifying our earlier approach.

F/M 3. George Blondin wonders how high on the wall does a 20-foot ladder reach when it rests against the edge of a 4-foot cube?

Beautiful solutions were received from Henri Hodara and John Kennedy. Hodara's is reprinted below. John Prussing objects to the problem because he found it while cleaning up the living room and now has solved the problem, but not cleaned the room!



The two possible solutions are shown in the figure above. Pythagoras gives:

(1) $h^2 + b^2 = 400$

Since the two shaded triangles in the figure are similar,

(2a) $(h - 4)/4 = 4/(b - 4)$, or

(2b) $bh = 4(b + h)$

Squaring (2b) and combining with (1) yields a quadratic in (hb),

(3) $(hb)^2 - 32\,(hb) - 6400 = 0$

whose solution is

(4) $hb = 97.58$

Multiplying now both sides of (1) by h^2 yields a quadratic in h^2:

(5) $h^4 - 400\,h^2 + (97.58)^2 = 0$

The two solutions of (5) are:

$h = 19.35,\ h = 5.04$

and the corresponding values of b follow from (2a) are:

$b = 5.04,\ b = 19.35$

Other Responders

Responses have also been received from T. Blatt, F. Carbin, D. Church, D.DeLeeuw, S. Feldman, M. Fountain, S. Gaither, M. Garrison, T. Harriman, D. Harris, W. Hartford, K. Haruta, P. Herkart, R. Hess, A. Hirshberg, R. Hoffman, R. Holt, E. Kapplan, P. Kramer, P. Lally, H. Lieberman, M. Lindenberg, L. Nissim, A. Ornstein, A. Palmer, J. Pickel, K. Rosato, E. Sard, D. Savage, L. Schaider, A. Shagen, D. Simen, R. Sinclair, N. Spencer, L. Steffens, H. Stern, A. Ucko, D. Wagger, T. Weiss, R. Whitman, A. Wiegner, C. Willy, and J. Woodman.

Proposer's Solution to Speed Problem

They need to know how to log a rhythm.

job in computer programming, five years an independent consultant, and finally, in 1993, I decided to get a real job and enrolled in law school. Been out here in Berkeley since then at Boalt Hall School of Law at UC/Berkeley.

Another 14 months or so and I'll be loose on an unsuspecting planet. Woe be to any Republicans or other subverters of the Constitution. I see Debbie Lerman occasionally, and saw Fort Felker out here in 1991 or so."

From Bill May: "I have been reading your section in *Tech Review* for years (and noticed several classmates along the way), but never contributed. Maybe it is about time! First, I would like to say hello to fellow Bexleyites. There was a reunion a couple (few?) of years ago I would have liked to attend. I have been married for eight years now, and have a 5-year-old son. We live in San Jose, Calif. (although we would like to move back to the Boston area some day, closer to family and friends). I work at a startup company, Minerva Systems, as principal software engineer. We are developing high-quality MPEG video and audio encoders for the (hopefully) coming digital video revolution. Not an easy task! Nevertheless, Minerva has gone from 6 to 40 employees in the past several months, and things seem to be progressing quite well."

Alan Dubin sends e-mail: "In 1983 I started working for the Engineering Materials sector of Allied Signal, based in Morristown, N.J. My group is called Modulus, referring to the design engineering and technical support service provided to customers of our thermoplastic resins, Capron nylon, and Petra polyester. In February 1993, I accepted an overseas assignment to work in our European headquarters in Haasrode, Belgium (near Louvain), to be responsible for our customers in Europe and the Middle East. With wife Mary Anne and daughter Lisette, who was 8 months old at the time, we packed up our house and became expatriates. Since then we had a son, Justin, born over here in July 1993, coincidentally a mere 20 minutes after the death of Belgium's former King Baudouin. Notwithstanding, he is still considered a U.S. citizen by the authorities. Living and working in Europe these last two years has been an experience, to say the least, quite different from our past lives in the United States—at certain times quite challenging, and at other times frustrating. Belgium is probably one of the more easy countries to assimilate into, since like much of western Europe, it has been highly 'Americanized.' They have three official languages: Flemish, French, and German, and it helps to speak at least one of them fluently. We started out by studying French and ended up living in a Flemish town, Overijse, with little regret. Nearly everyone educated since the 1950s understands at least some English, so it isn't that hard to get by. Among the more challenging aspects of life here at first involved setting up house with two small infants, finding all the right baby products, especially pediatric care up to U.S. standards (still somewhat of a compromise), and dealing with the local bureaucracy. After battling against Belgian drivers, I'll never again criticize Boston. Once we had settled in and began meeting people, things became easier. Our one major regret is that, while I've been to some exciting places on business, it's been difficult to travel extensively through Europe as a family with the kids still so young. We're hoping this will improve in '95, after which it will be time to repatriate and experience the culture shock anew."

We also have news through the postal mail. Jeslie Chermak writes: "Finally made use of my frequent flyer miles (collected over 10-plus years) and my accumulated vacation time for a trip to Australia. Went diving in the Coral Sea from a sailboat and the Great Barrier Reef, plus some cold-water diving in Tasmania that