INTRODUCTION

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 email, since these produce fewer typesetting errors.

PROBLEMS

Jul 1. We begin with a Bridge problem from Leonard Nissim that he believes came from *Bridge World* magazine in the 1980's.

You are South, and will be the declarer in an undoubled contract. West will lead the King of Spades against any contract, and you are to presume best defense after that lead. What contract would you like to be in?

North

S	7 5 3 2
H	A Q
D	A K Q T
C	K J 9

West

S	K Q J
H	K J
D	J 9 8 7
C	Q T 8 7

East

S	T 9
H	T 9 8 7
D	6 5 4 3
C	5 4 3

South

S	A 8 6 4
H	6 5 4 3 2
D	2
C	A 6 2

Jul 2. Tom Harriman wants to know the positive integer solutions to

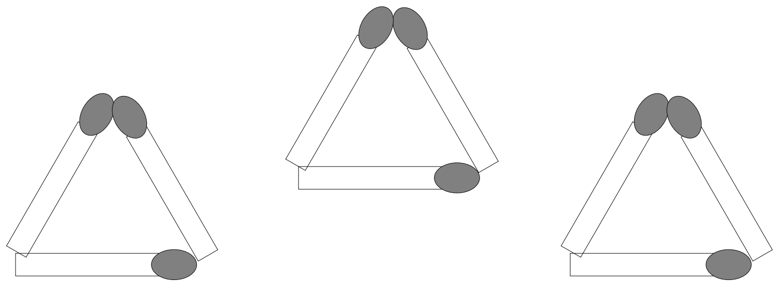
$$2a^2 = b^2 + 1$$

Jul 3. This nautical challenge is due to Eric Lehman.

Suppose you are floating in a sea of 7's, and you have a raft with the number 101. You discover that you can take a 7 and insert it into your raft to enlarge the number (getting 7101, 1701, 1071, or 1017). Unfortunately, every time you do this, the number divides itself by its smallest prime factor (leaving, from the above example, 2367, 567, 357, or 339). You know that if the number goes below 100, your raft will sink. What is the longest you can survive?

SPEED DEPARTMENT

Nob Yoshigahara wants you to move two matches so that no triangle remains.



SOLUTIONS

F/M 1. The following bridge problem is from Tom Harriman who wants to know how you make the contract against best defense after an opening lead of the Diamond Jack.

	North
S	Q 3
H	A K Q 2
D	8 6
C	A Q 10 4 2

	West		East
S	10 9 8	S	A 6
H	9 7 6 5	H	J 10 8 4
D	J 10 2	D	A K 7 4 3
C	9 8 5	C	J 7

	South
S	K J 7 5 4 2
H	3
D	Q 9 5
C	K 6 3

W	N	E	S
pass	1 Club	1 Diamond	1 Spade
pass	2 Hearts	pass	2 Spades
pass	3 Spades	pass	4 Spades
pass	pass	pass	

The following solution comes from Chip Kieronski

The best defense is for East to cash the Ace and King of Diamonds and continue a Diamond. Otherwise, declarer can pitch his remaining Diamonds on Hearts, force out the Ace of trumps, win any return, draw trumps and take the rest.

Assuming East adopts this defense, declarer wins the Queen of Diamonds and takes the Ace and King of Hearts, pitching a Club. He then ruffs a Heart, plays a Club to the Queen, ruffs dummy's last Heart, overtakes the King of Clubs with the Ace and leads the Ten of Clubs.

If East ruffs with the Ace and leads a trump, declarer underruffs the Ace and takes the last three tricks with the Queen, King and Jack of trumps.

If East ruffs with the Ace and leads a Diamond, West must ruff, but dummy overruffs and takes the last two tricks with the King and Jack of trumps.

If East discards or ruffs with the Six, declarer ruffs (or overruffs) with the Seven, forces out the Ace of trump and wins the last two tricks with the King and Jack of trumps.

The key to the hand is stripping West of side suit cards so that he must underruff South when East plays a fourth Diamond, thereby preventing a trump promotion.

F/M 2. Joe Shipman knows two tennis players who are evenly matched. That is, whoever is serving has a probability p (0<p<1) of winning the point. Find a value of p and a ''game situation'' where the player who is ''ahead'' under standard tennis scoring is a underdog to win the set. To clarify, an example game situation would be ''server ahead 5 games to 2 and up 40 love in the present game'' (however, in this example I do not believe there is a p satisfying the desired conditions).

Stephen Shalom shows us how you can be behind even though ahead.

Assume the score in the tennis match is 4 games all, with the server, player A, ahead 40-30. Player A wins the ninth game either (1) by winning the eighth point or (2) by losing the eighth point and winning the deuce game.

The odds of winning a deuce game in the next two points is p^2. The odds of losing in the next two points is $(1-p)^2$. If a player neither wins nor loses in the next two points, then the same situation repeats itself. Thus, the odds of winning a deuce game once deuce is reached are

$$p^2/[p^2+(1-p)^2]$$

The odds of A winning the ninth game are therefore

$$p+(1-p)p^2/[p^2+(1-p)^2]=Q$$

Player B will win the ninth game whenever A doesn't win it: $1-Q$.

B will win the tenth game whenever the score of that game is either game-love, game-15, game-30, or when B wins a deuce game.
The odds of B winning game-love are p^4.
The odds of B winning game-15 are $4p^4(1-p)$.
The odds of B winning game-30 are $10p^4(1-p)^2$.
The odds of B winning a deuce game are the odds of reaching deuce, $20p^3(1-p)^3$, times the odds of winning once deuce is reached, $p^2/[p^2+(1-p)^2]$, which equals:

$$20p^5(1-p)^3/[p^2+(1-p)^2]$$

The sum of these four possibilities is:

$$p^4\{1+4(1-p)+10(1-p)^2+20p(1-p)^3/[p^2+(1-p)^2]\}=R.$$

Player A will win the set 6-4 with odds $Q(1-R)$. Player B will win 6-4 with odds $(1-Q)R$. (We can ignore sets that go more than 10 games, for then the score had to reach 5-5, and from there on the players have an equal chance of winning.) So the problem reduces to finding p such that $(1-Q)R>Q(1-R)$, or $R>Q$. Simple substitution shows that for $1>p>.92$, $R>Q$.

F/M 3. Nob Yoshigahara wants you to arrange the nine cards below into a 3x3 square so that all twelve pentominoes appear in the interior of the square.

Faith, please pick up artwork from f/m

Walter Cluett sent us the solution below, which was really produced by cutting and pasting. Richard Hess notes that this problem was solved in Jacques Haubrich's *Compendium of Card Matching Puzzles*.

Please place figure number 1 here.

OTHER RESPONDERS

Responses have also been received from R. Bart, R. Bishop, M. Fountain, R. Giovanniello, D. Gross, J. Grossman, J. Harmse, M. Herbert, E. Reynolds, K. Rosato, D. Savage, D. Wachsman, B. Wake, A. Wasserman, and D. Yanis

PROPOSER'S SOLUTION TO SPEED PROBLEM