I normally go over the ground rules for "Puzzle Corner" in September (i.e., Aug/Sep), the first issue of the academic year. However, this September will be the 40th anniversary of the column in *Technology Review*, so I should probably reserve the introduction for that topic. As a result, I will give the basic rules of the column now.

In each issue I present three regular problems, the first of which is normally bridge (or chess or some game) related, and one "speed" problem. Readers are invited to submit solutions to the regular problems, and two columns (i.e. four months) later, one submitted solution is printed for each regular problem; I also list other readers who responded. For example, the current issue contains solutions to the regular problems posed in March/April.

I am writing this column in April and anticipate that the column containing the solutions will be due in August. Please try to send your solutions early to ensure that they arrive before my submission deadline. 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, as are solutions to previously unsolved problems.

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 first issue of each year, and sometimes I go back into history to republish problems that remained unsolved when they were first presented.

PROBLEMS

J/A 1. We begin with an unusual bridge problem from Larry Kells. What is the largest possible margin of victory in a rubber where no contract is defeated?

J/A 2. Richard Hess offers a problem that is somewhat related to our yearly challenge. Hess notes that a good approximation to π using each digit 1 to 9 exactly once is $\pi = 3+(16-8^{-5})/97+2^4$.

Hess first wants you to do better, still using 1 to 9 exactly once each. You may use +, –, *, /, exponents, decimal points, and parentheses but may not use any "other operators or functions." He also asks, If you are instead allowed 0 to 9 exactly once each (i.e., 0 is added to the list of digits), how good an approximation can you find (again limited to +, –, *, /, exponents, and parentheses)?

J/A 3. Phil Latham notes the following curious property of the six-letter word "priest." If you remove any one of the letters, the remaining five letters can be arranged to form an English word. For example, if you delete the "p", you can form "tries;" if you delete the "r," you can form "spite." What is the longest English word having the property that, if any letter is removed from the word, the remaining letters can be arranged to form an English word? If the original word contains, say, three *t*s, and a *t* is removed, the new word must contain two *t*s; if some other letter is removed, the new word must contain three *t*s.

SPEED DEPARTMENT

Ted Mita has an accurate grandfather clock that uses 24-hour time. What is the longest period you can be in the room and not know what time it is? Round your answer to the nearest five minutes. [I assume such a clock chimes 24 (not zero) times at midnight.–Ed.]

SOLUTIONS

M/A 1. The proposer obtained an answer of 7.45559E-08, and his analysis, given below, looks correct to me. However, other readers obtained different odds, and I am not a bridge expert. Kells writes, "I got to thinking, What are the chances of being dealt a hand that guarantees that you can make a slam as declarer in a suit contract, when you don't know the contents of the other three hands, and assuming the defense is always perfect? (For the sake of this discussion, we assume nobody outbids you.) Obviously, the only guaranteed grand slams in a suit are the 13-card suit holdings. If you don't hold all the trumps, the opponents may be able to ruff the opening lead, while you have to follow suit. But for small slams this turned out to be very interesting. Some facts can be deduced:

"(a) You must hold cards in only two suits. Otherwise, the opponents may be able to cross-ruff the first two tricks, while you have to follow suit.

"(b) You must have at least seven trumps. Otherwise, in light of (a), the opponents may force you to ruff the opening lead. Then, if an opponent holds seven trumps, he is bound to win two trump tricks. (As a corollary, this means that you can never have a guaranteed slam in more than one suit.)

"(c) Your trump suit must be solid enough to withstand the worst possible break and the possibility of trump promotion. There cannot be any natural trump losers, since the opponents may ruff the opening lead as well. (This does not apply if you have a 12-card suit.)

"(d) Your side suit cannot be missing the ace, unless you have a singleton. Otherwise, the opponents may take the ace and then a ruff. If they ruff the opening lead in your side suit, your remaining cards in that suit must be solid from the top, so you won't have another loser.

"Let's look at the case where you are 7-6. Suppose you hold S-AKQJ109x, H-AKQJ10x (here, x means anything smaller than what is shown in that suit). This works. If the first trick is not a heart ruff, you win and can draw trumps under any scenario. The only possible loser is a heart. If the first trick is a heart ruff, you can afford to ruff the next trick high (LHO has at most five spades), draw trumps, and cash high hearts. It would not work if your hearts were AKQJ9x. The opponents may ruff a heart, and you could still lose to the 10 of hearts later. It would also not work if your spades were AKQJ108x, even if your hearts were AKQJ109. They could ruff a heart with a singleton trump and then promote LHO's 9xxxx through a lead in which you are both void.

"This reasoning generalizes to other distributions:

8-5 AKQJ10xxx, AKQJx
9-4 AKQJxxxxx, AKQx
10-3 AKQxxxxxxx, AKx
11-2 AKxxxxxxxxx, Ax

"However, as noted in (c) and (d) above, the case of the 12-card suit is special. There are two successful patterns:

"(a) Twelve headed by AK, with a singleton below the ace. Then your suit is solid enough to withstand any trump promotion attempt. (Note that S-AQJ1098765432, H-x, which would be another case of the generalized pattern above, does not work. The opponents could lead a singleton heart to RHO's ace, then promote LHO's king of spades with another heart lead. The lack of the side ace matters.)

"(b) Any 12-card suit with a singleton ace. At worst, the opponents get their trump; they cannot get anything else.

"To tally up the cases, note that for each case there are 12 suit permutations. Within each permutation, the numbers are as follows:

7-6: 7C1 * 8C1 = 7*8 = 56
8-5: 8C3 * 9C1 = 56*9 = 504
9-4: 9C5 * 10C1 = 126*10 = 1,260
10-3: 10C7 * 11C1 = 120*11 = 1,320
11-2: 11C9 * 12C1 = 55*12 = 660
12-1a: 11C10 * 12C1 = 11*12 = 132
12-1b: 13C12 = 13

"Total: 3,945 per permutation of suits, 47,340 all permutations. Add in the four grand slam cases, overall total 47,344 possible hands. There are 635,013,559,600 different hands, so the probability of a guaranteed slam hand in a suit contract is one in 13,412,757."

M/A 2. Several readers commented that, since there was no penalty for a wrong answer, the first two suitors should have taken a guess. Richard Hess accompanied his solution with a collection of more complicated "logical hat problems," some of which will appear in future installments of "Puzzle Corner." I believe that the following solution from Andy Frakes correctly captures the spirit of the problem:

"After making the obligatory assumption that all of these suitors are sufficiently intelligent, we begin by writing down the seven possible combinations of crown colors for the three suitors: GSS, SGS, GGS, GGG, GSG, SSG, and SGG (note: GSS indicates that the first suitor is wearing a gold crown and the second and third suitors are wearing silver crowns). Note that only the first three scenarios involve the third suitor wearing a silver crown.

"The first suitor's inability to determine his crown color eliminates the first scenario (GSS), since there are only two silver crowns, and the suitor would know his crown was gold upon seeing silver crowns atop suitors two and three. When the second suitor cannot determine his crown color, we eliminate the second scenario (SGS), using the same logic we employed to eliminate the first. But we can also eliminate the third scenario (GGS). To illustrate why we can do this, imagine what the second suitor would be thinking while looking at a gold crown on the first suitor and a silver crown on the third suitor. He would be trying to choose between scenarios GGS and GSS, and he would know that his crown was gold, because GSS has already been eliminated by the first suitor's indecision. Since all of the remaining scenarios feature the third suitor sporting a gold crown, he does need to see the other crowns to know that his is gold.

"For brevity, I omitted some minor assumptions (suitors are aware that other suitors are intelligent enough to make all the correct choices, guessing is not an option, etc.)."

OTHER RESPONDERS

Responses have also been received from Auran, R. Bishop, G. Celani, W. Cluett, E. Collins, G. Coram, S. Davidson, D. Detlefs, A. Faller, S. Feldman, E. Field, M. Fineman, J. Freilich, L. Gershun, R. Giovanniello, K. Glasser, J. Hardis, J. Harmse, T. Harriman, A. Hirshberg, H. Hodara, S. Hodara, I. Jaszlics, D. Katz, R. Krawitz, E. Landauer, A. MacDonald, R. Marks, D. Miekka, T. Mita, M. Moss, S. Nason, A. Ornstein, J. Pinson, J. Prussing, K. Rosato, E. Rose, S. Shuchat, E. Signorelli, E. Staples, A. Taylor, J. Tsai, T. Weiss.

PROPOSER'S SOLUTION TO SPEED PROBLEM

One and a half hours. If you enter just after midnight, you hear one chime at 00:30, one at 01:00, and one at 01:30. Then you know the time. If you enter just after 00:30, you hear one, one, and two, and know the time.

Send problems, solutions, and comments to Allan Gottlieb, New York University, 715 Broadway, Room 712, New York NY 10003, or to gottlieb@nyu.edu.