INTRODUCTION

This being the first issue of a calendar year, we again offer a “yearly problem” in which you are to express small integers in terms of the digits of the new year (1, 9, 9, and 6) and the arithmetic operators. The problem is formally stated in the “Problems” section, and the solution to the 1995 yearly problem is in the “Solutions” section.

PROBLEMS

Y1996. How many integers from 1 to 100 can you form using the digits 1, 9, 9, and 6 exactly once each and the operators +, -, × (multiplication), / (division), and exponentiation. We desire solutions containing the minimum number of operators; and, among solutions having a given number of operators, those using the digits in the order 1, 9, 9, and 6 are preferred. Parenthesis may be used for grouping; they do not count as operators. A leading minus sign *does* count as an operator.

Jan 1. Now that you have just solved the yearly problem, take a crack at this variant from Philip Jacobs, who wants you to find numbers that can be formed using their own digits in a non-trivial way. That is, we do not want a trivial solution like

$$128 = 128$$

but do want the solution

$$128 = 2^{8-1}$$

Jan 2. This problem appeared in Solomon Golomb's puzzle column in *Johns Hopkins Magaine*. You are to dissect the figure below into four congruent pieces.

Please place figure number 1 here.

SPEED DEPARTMENT

Speedy Jim Landau wants you to name the following organic compound.

Please place figure number 2 here.

SOLUTIONS

Y1995. The following solution is from John Drumheller.

Please place figure number 3 here.

A/S 1. We start with a Bridge problem from Doug Van Patter that occurred during an ACBL (country-wide) charity event.

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

Your partner opens a skinny one spade. After discovering that one ace is missing, you bid six no trump (trying to protect heart king). Opening heart lead is taken by dummy’s ten. The jack of clubs is finessed and the heart king cashed. A low diamond to queen is taken by East’s ace, who returns a spade. Can you now make your unlikely contract?

I wonder if Bob Lax has milked a lot of cows since he is so good at the double squeeze. I am a city boy but once did milk a cow. I was in New Zealand and attended a show where they let the city slickers try their hands at milking. I was *extremely* surprised to find out how hard you had to squeze and pull. Also after a few minutes, I had produced pretty much just a ‘‘drop in the bucket’’. Lax writes.

In this hand, East must save diamonds and clubs and West must save diamonds and hearts - sounds like a double squeeze. Win East’s spade lead on the fifth round with the ace. Then cash the ace of clubs, discarding a small diamond from dummy. Lead the 3 of spades to dummy’s queen. Now play the ace of hearts, discarding the king of spades from the South hand. Then, run dummy’s good spades. On the 11th round, dummy’s 6 of spades is led. If East decides to discard all his clubs, then South discards the 9 of diamonds and wins the last two tricks with the king of diamonds and the queen of clubs. If East saves the king of clubs, then South discards the queen of clubs. Now, West is squeezed; if West discards the queen of hearts, then the last two tricks are won by the jack of hearts and the king of diamonds, while if West discards a diamond, then the last two tricks are won by the king and nine diamonds.

A/S 2. Don ‘‘Hoppy’’ Hopkins has an arithmetical crossword puzzle for us. He often gives out the answer to 7 across as a hint since it is easy to look up, but takes time. If you wish to have this hint see the end of the column.

Unfortunately, there were two typos in A/S 2: The clue for 8 down should be ‘‘The sum of 15 Across and 27 Across’’ and in 33 across ‘‘105’’ should be ‘‘ten to the fifth’’, i.e. the ‘‘5’’ should be a superscript. I appologize for the errors and hereby re-open the problem. Solutions will be printed in the May/June issue.

Faith please reproduce artwork with above typos corrected

One of the errors was in the manuscript itself

A/S 3. Rick Hendrik wonders, given a regular dodecahedron (12 pentagonal faces) with an edge length of 10, what is the largest regular icosahedron (20 triangonal faces) that will fit inside?

This appears to be a difficult problem, but one well liked by Winslow Hartford and Ken Rosato, who each sent in detailed solutions accompanied by carefully drawn diagrams. Hartford’s calculations yield an answer of 11.7167, while Rosato’s yield 11.7082. The proposer asserts that the answer is 11.7023. Space does not permit printing either Hartford’s or Rosato’s solutions, but both can be obtained from Faith Hruby at *Technology Review*.

BETTER LATE THAN NEVER

F/M/1. Jorgen Harmse notes that we left out a bid as the auction shown leads to 7 Diamonds not 7NT. The solution printed is correct.

F/M 3. Douglas Merkle notes that a simpler solution exists. Let L be the ladder length, S be the block side length, and h be the desired height, and proceed as follows.

$$\Theta = \tan^{-1}(L/S)$$

$$\Psi = \cos^{-1}\left(\frac{2\cos\Theta}{1-\cos\Theta}\right)$$

$$x = \frac{1 \pm \sin\Psi}{\cos\Psi}$$

$$h = S(1+x)$$

OTHER RESPONDERS

Responses have also been received from G. Bailey, L. Beckett, M. Britten-Kelly, Rev. M. Buote, T. Cirillo, H. Cohen, K. Comer A. Curtis, C. Dale, J. Datesh, A. Demers, J. Diamond, E. Doniger, J. Drabicki, J. Dunn, W. Evarts, G. Gonzales, J. Goodman, J. Grossman, A. Halberstadt, W. Hartford, R. Hess, S. Jefferson, R. Jones, T. Kaiser, R. Lax, G. Marotta, H. Meerman, A. Meissner, M. Moritz, B. Myers, K. Nahabet, B. Norton, A. Ornstein, D. Park, E. Pendergast, G. Price, M. Qubbaj, C. Rivers, K. Rosato, D. Savage, I. Schaefer, I. Shalom, R. Shorey, H. Thrasher, A. Tracht, J. Varnick, R. Whitman, S. Whittemore, and A. Wright.

PROPOSER’S SOLUTION TO SPEED PROBLEM

Recyclopropane.

The hint for **A/S 2** is 1913.