Puzzle Corner

Allan J. Gottlieb

Assume a Solution Exists

There has been some confusion between the author and the editors as to my deadline. Since I am late with this column, please forgive (but please do not applaud) my omitting the customary opening monologue. (But please note: send problems, solutions, and comments to me at the Department of Mathematics, University of California, Santa Cruz, Calif., 95060.)

Problems

The bridge problem for this month is by Allan Truscott of the *New York Times* by way of Frank Mouel, who wants to know:

51 Can the following contract be made against any defense?

North: ♠ 7 3 2; ♥ 5 4 2; ♦ A 10 9 7 6; ♣ 3 2

West: ♠ K 6 4; ♥ K J 7 6; ♦ K J; ♣ K Q J 5

East: ♠ 8; ♥ 9 8; ♦ 8 5 4 2; ♣ 10 9 8 7 6 4

South: ♠ A Q J 10 9 5; ♥ A Q 10 3; ♦ Q 3; ♣ A

South	West	North	East
1 ♠	Double	2 ♦	Pass
3 ♠	Pass	4 ♠	5 ♣
5 ♠	Double	Pass	Pass
Pass			

A geometry problem from Frank Rubin:

52 A sphere is inscribed in a tetrahedron (not necessarily regular). From the four tangency points, lines are drawn to the three adjacent vertices. Prove that the three sets of angles thus formed are equal.

Mark Baldwin submits the following "Cartesian geometry" problem:

53 Given a circle [of radius r and center (h,k)] and a point P [having coordinates (p,q)], find, without using calculus, the coordinates of the point B on the circle having the property that the line segment PB is tangent to the circle.

A cutie from John T. Rule, who writes, "For my money, the following is one of the most intriguing of all problems; it comes from none other than that master puzzler, Sam Lloyd:"

54 All cows eat always at exactly the same rate. Four cows eat three acres of grass in two weeks; three cows eat three acres of grass in three weeks; How long will it take five cows to eat six acres?

The final problem is from P. Markstein:

55 Let F_n be the nth Fibonacci number ($F_0 = 0$, $F_1 = 1$, $F_i = F_{i-1} + F_{i-2}$). Prove that $F_{n-2}^4 \equiv F_{n-1}^4 \equiv F_{n+1}^4 \equiv F_{n+2}^4 \equiv 1 \pmod{F_n}$.

Speed Department

R. Robinson Rowe wants to know:
What kind of book would say that a 10 × 10 square has area 10?

Here is a series of geography questions from George A. W. Boehm (you'd better check your answers on a map):
What is the northernmost state? The southernmost state? The westernmost state? The easternmost state? The first foreign country you come to going directly south from Detroit? The largest city east of Reno and west of Chicago?

Solutions

Here are solutions to problems published in the July/August issue. By mistake (the editors'), the same numbers were also assigned to the problems in the October, 1971, issue, the answers to which will be published next month.

41 How did the declarer win this hand:

North: ♠ K 9 4; ♥ 8 2; ♦ A Q 10 6 5; ♣ 8 6 2

West: ♠ Q 3; ♥ Q 10; ♦ J 8 7 2; ♣ K J 9 5 4

East: ♠ J 10 8 6; ♥ A 9 4; ♦ 9 4 3; ♣ Q 10 3

South: ♠ A 7 5 2; ♥ K J 7 6 5 3; ♦ K; ♣ A 7

Neither side was vulnerable. The bidding:

North	*East*	*South*	*West*
Pass	Pass	1 club	Pass
2 diamonds	Pass	2 hearts	Pass
3 diamonds	Pass	3 N.T.	Pass
Pass	Pass		

West led the ♣5.

Rex Ingraham responds: There is no way the declarer can win nine tricks on this deal if the defenders play properly. You're asking me to guess how they managed to let the declarer romp home with it? How about this: East plays ♣Q to the first trick; off-balance with surprise at winning, he thinks the declarer really wants him to continue the suit. South's ♣7 is to him no promise that West can win more than two additional clubs; therefore he returns ♠J in a scheme to set the declarer down with at least one spade, one heart, and three club tricks. Declarer wins the second trick with ♠K and returns ♥2 from dummy. East's hearts are under the declarer's bid suit; he could hold off but decides to take ♥A at once in order to let West know both that the declarer does not have that valuable card but also that both West, whose hearts are over the declarer's, must defend the suit. After that it doesn't matter what East elects to return. The declarer can win and cash out with five hearts, two spades, two diamonds, and one club for his contract and an overtrick.

Also solved by Philip D. Bell, Winslow H. Hartford, Mrs. Martin S. Lindenberg, Jeffrey A. Miller, Edwin A. Nordstrom, R. Robinson Rowe, and G. Steinitz.

42 Show that for any positive integer n, $3^{2n+1} + 2^{n+2}$ is divisible by 7.

The following is from Winslow H. Hartford: Assume a solution exists for some value of n (as it does for any value you care to check!). Now it can be shown that the algorithm for n = n + 1 differs by a multiple of 7 and hence is divisible by 7. For n = n + 1, the algorithm takes the form:

$3^{2n+3} + 2^{n+3}$.

The difference can be expressed by:

$(3^{2n+3} - 3^{2n+1}) + (2^{n+3} - 2^{n+2}) =$
$3^{2n+1}(8) + 2^{n+2}(1) =$
$(3^{2n+1} + 2^{n+2}) + 7(3^{2n+1})$.

The first term is equal to a known solution, the second is a multiple of 7; therefore the entire expression is divisible by 7, and a solution exists for n = n + 1.

Also solved by Robert W. Baird, Gerald Blum, Charles Bures, Harold Donnelly, Joseph S. Evans, Jo Ann S. Flaun, Richard Jenney, Mrs. Martin S. Lindenberg, John E. Prussing, R. Robinson Rowe, Frank Rubin, G. Steinitz, Clark Thompson, Harry Zaremba, and M. Otto Zigler, VI.

43 Two brothers owned an orange grove. After their oranges were picked, one brother divided them into 39 baskets and found that there were 16 oranges left over. The second brother then took all of the oranges and put them into 56 smaller baskets, finding that there were now 27 oranges left over. What is the smallest number of oranges possible, and what are the next four larger numbers of oranges which fulfill the conditions?

The following is from R. Robinson Rowe: If N is the number of oranges and x and y are the capacities of the larger and smaller baskets, respectively, the given data are expressed:

$N = 39x + 16 = 56y + 27$,

which is a diophantine equation in two unknowns, to be solved in integers. The general solution may be expressed in terms of any integer u:

$x = 29 + 56u$; $y = 20 + 39u$; $N = 1147 + 2184u$,

and the smallest and next four values for N are 1147, 3331, 5515, 7699, and 9883. I noted that for 1147 oranges, the smaller basket would hold 20, filling 56 baskets with 27 left over. The leftovers would have filled a 57th basket with 7 left over. Reading the problem carefully, I interpret it that there were only 56 baskets. But if this was intended for a "catch," that he had plenty of baskets and could fill only 56, then the smallest N would have been 3331; for this many oranges, the baskets would have held 85 and 59, respectively—gargantuan baskets or lilliputian oranges!

Also solved by John Babbitt, Robert W. Baird, Charles Bures, Gerald Blum, Neil Cohen, Harold Donnelly, G. Evans, Winslow H. Hartford, Richard Jenney, Marc Judson, Sanford M. Libman, Mrs. Martin S. Lindenberg, Edwin A. Nordstrom, Frank Rubin, G. Steinitz, Clark Thompson, Paul G. N. de Veguar, Harry Zaremba, Ken Zwick, and the proposer, Warren Himmelberger.

44 The letters of a saying are written in order on squares 1 to 32 of a checkerboard with the usual numbering system. A certain game of checkers might then be written:

	32 D		31 E		30 I		29 R
28 T		27 S		26 I		25 W	
	24 E		23 N		22 E		21 H
20 T		19 M		18 O		17 H	
	16 W		15 Y		14 B		13 T
12 S		11 R		10 I		9 F	
	8 E		7 H		6 T		5 T
4 O		3 N		2 E		1 B	

1. R—Y E—H
2. E—R H—B
3. F—O N—B
4. I—H H—B
5. O—E I—N
6. T—I W—H
7. I—H H—B
8. B—T R—W
9. T—F E—I
10. F—O N—B
11. S—W E—T
12. E—T W—H
13. T—F I—N
14. F—O N—B
15. W—M I—I
16. Y—O B—I
17. H—B S—N
18. O—S D—H
19. D—H Drawn

The proposer, Walter Penney, supplied the answer; the saying is: "Be not the first by whom the new is tried." His "moves" were:

1. 11—15 22—17
2. 8—11 17—14
3. 9—18 23—14
4. 10—17 21—14
5. 4—8 26—23
6. 6—10 25—21
7. 10—17 21—14
8. 1—6 29—25
9. 6—9 31—26
10. 9—18 23—14
11. 12—16 24—20
12. 2—6 25—21
13. 6—9 26—23
14. 9—18 23—14
15. 16—19 30—26
16. 15—18 14—10
17. 7—14 27—23
18. 18—27 32—7
19. 3—10 Drawn

Also solved by Mary J. Youngquist.

45 Determine an 8 × 8 upside-down magic square from the 64 three-digit numbers made of the digits 1, 6, 8, and 9.

The following is from Loren L. Dickerson, Jr.: Here are two of an undetermined number of 8 x 8 magic squares of the 64 three-digit numbers specified. These are pan-diagonal, in that all 16 diagonals have the same sum, 5328, as the rows and columns:

111	166	689	691	818	869	986	998
919	961	188	199	616	668	881	896
868	889	996	918	161	186	699	611
666	688	891	816	969	981	198	119
181	196	619	661	888	899	916	968
989	991	118	169	686	698	811	866
898	819	966	988	191	116	669	681
696	618	861	886	999	911	168	189

616	698	881	866	919	991	188	169
818	899	986	968	111	196	689	661
969	911	198	189	666	618	891	886
161	116	699	681	868	819	996	988
686	668	811	896	989	961	118	199
888	869	916	998	181	166	619	691
999	981	168	119	696	688	861	816
191	186	669	611	898	889	966	918

Also solved by R. Robinson Rowe, Harry Zaremba, and the proposer, David DeWan.

Better Late Than Never

Solutions to the following problems have been received:

21 C. N. Galvin
26 E. L. Condon, C. N. Galvin, Jack Groth, and Robert H. Park
34 Andrew Cahn
36 John E. Burchard
37, 40 Raymond Gaillard

Books

James Miller, William G. Denhard

Technology and the Unfreedom of Man

History and Class Consciousness, Studies in Marxist Dialectics
Georg Lukács
Translated by Rodney Livingstone
Cambridge, Massachusetts, The M.I.T. Press, 1971, 356+xlvii pp., $8.95

Toward a Rational Society, Student Protest, Science, and Politics
Jürgen Habermas
Translated by Jeremy J. Shapiro
Boston, Beacon Press, 1970, 132+ix pp., $5.95

Knowledge and Human Interests
Jürgen Habermas
Translated by Jeremy J. Shapiro
Boston, Beacon Press, 1971, 349+viii pp., $7.50

Reviewed by
James Miller
History of Ideas
Brandeis University

A hitherto largely hidden current of European social thought is finally becoming available to American readers. For decades, important investigations by theoreticians and philosophers of a broadly Marxist persuasion have led at best a subterranean existence in this country. But the recent publication of works by Georg Lukács, Jürgen Habermas, Ernst Bloch and Theodor Adorno should help rectify this situation. English-speaking readers may now place into historical perspective the tradition of social criticism whose best-known representative in the United States is Herbert Marcuse.

This tradition is still of interest today in part because it elaborated a far-reaching critique of science and technology during a period when America still innocently upheld the gospel of scientific progress. During the 1920's and 1930's, the "Frankfurt School" of Marxism, whose members included Max Horkheimer, Adorno, Marcuse, Erich Fromm and Walter Benjamin, advanced this critique on two fronts. On the one hand, the methodology of the natural sciences, especially as it found expression in positivist philosophies, was assailed for veiling the methodology proper to the social sciences.

On the other hand, critical investigation into the real social role of technology disclosed the emergence of science and its technological applications as a new constituent element of the general material and spiritual oppression within advanced industrial societies. Whereas Marx had believed technology to be "neutral," Frankfurt's theoreticians perceived that whatever potential for liberation was embodied in man's growing ability to dominate nature also carried with it the possibility of an increasingly efficient domination of man by man. Yet this threat of technology's authoritarian dominion in the service of a repressive ruling order was occluded by the ideology of technological progress: the public celebration of science concealed the fact that key decisions concerning destructive and manipulative technical innovations were made privately by a small group of men.

Social Science: Passive or Active

The twentieth-century Marxist and neo-Marxist critique of science and technology can be examined at its inception and in a current revision in the works of Lukács and Habermas reviewed here. One of Lukács' criticisms in *History and Class Consciousness* focuses on the effect that the ideology of science has on research in the human and cultural sciences. The natural scientific method of inquiry—which elaborates formal laws on the basis of observable empirical regularities—when applied to the cultural sciences transforms social theory into a passive investigation of "pattern-maintenance" and integration that takes for granted the given social reality. From the natural scientific point of view, capitalist society appears as an absolute and "natural" phenomenon, rather than the transient historical phenomenon it in fact is. As Lukács puts it, "the methodology of the natural sciences . . . rejects the idea of contradiction and antagonism in its subject matter."

Yet according to Lukács' Hegelian-Marxian standpoint, the contradictions of capitalism are precisely the aspects that point to the eventual abolition of capitalism in favor of a more humane, less abstractly rationalized society. *History and Class Consciousness,* originally published in 1923, formulated a radical methodology of dialectical inquiry and social practice that served as the philosophical basis for the neo-Marxian theorizing of Adorno and Marcuse; it remains a seminal work.

The latent hostility evidenced in Lukács' attitude to science and technology has been elaborated more explicitly in Marcuse's *One-Dimensional Man.* There technology is seen as providing the "great rationalization of the unfreedom of man," protecting rather than challenging "the legitimacy of domination." Jürgen Habermas, a pupil of Adorno's and the most prominent younger member of the Frankfurt school, defines his position in opposition to that of Marcuse. While Habermas agrees with Lukács and Marcuse on the ideological effect natural scientific modes of inquiry have on social inquiry, he disagrees with any implications that