ALGORITHM 72
COMPOSITION GENERATOR
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procedure comp (c, k); value k; integer array c;
integer k;
comment Given a k-part composition c of the positive integer n,
comp generates a consequent composition if there is one. If
comp operates on each consequent composition after it is found,
all compositions will be generated, provided that 1, 1, . . . , 1,
n-k+1 is the initial c. If c is of the form n-k+1, 1, 1, . . . , 1,
there is no consequent, and c will be replaced by a k vector
of 0's. Reference: John Riordan, An Introduction to Combinatorial Analysis, John Wiley and Sons, Inc., New York, 1958, Chapter 6;

begin integer j; integer array d[1:k];
test: if d[j]>0 then go to set;
set: d[j] := 0;
exit:
last: 
for j := lstcpl until k do
d[j] := c[j] - 1;
go to exit;
in the product was -.00003. Most nondiagonal elements were less
integers less than ten in absolute value. When the matrix and its
inverse were multiplied together, the largest nondiagonal element
in the product was -.00003. Most nondiagonal elements were less
than .00(X)I in absolute value.

ANTHONY W. KNAPP AND PAUL SHAMAN

INVERT (T. C. Wood, Comm. ACM, April, 1961)

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INVERT was hand-coded for the LGP-30 using machine language and the 24.0 floating-point interpretive system, which carries 24 bits of significance for the fractional part of a number and five bits for the exponent. The following changes were found necessary:

(a) if j = n+1 then a[i, j] := 1.0 else a[i, j] := 0.0;
should be
if j = n+1 then a[i, j] := 1.0 else a[i, j] := 0.0;

(b) for k := j step 1 until 2 × n do
a[i, k] := a[i, k]/a[i, j];
should be
for k := 2 × n step -1 until i do
a[i, k] := a[i, k]/a[i, j];

(c) if i ≠ i then for k := 1 step 1 until 2 × n do
a[i, k] := a[i, k] - a[i, k] × a[i, j];
should be
if i ≠ i then for k := 2 × n step -1 until i do
a[i, k] := a[i, k] - a[i, k] × a[i, j];

Given these changes, j becomes superfluous in the second i loop, and the other references to j may be changed to references to i.

INVERT obtained the following results:

The exact inverse is:

\[
\begin{array}{cccc}
16 & -120 & 240 & -140 \\
-120 & 1200 & -2700 & 1680 \\
240 & -2700 & 6480 & -4200 \\
-140 & 1680 & -4200 & 2800 \\
\end{array}
\]

The program coded in the 24.0 interpretive system successfully inverted a matrix consisting of ones on the minor diagonal and zeros everywhere else.

REMARK ON ALGORITHM 52
A SET OF TEST MATRICES (John R. Herndon, Comm. ACM, April, 1961)

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In the assignment statement
c := tX(t + 1)X(t + 1 - 5)/6; (a)
the t is undefined. A suitable definition would be provided by preceding (a) with t := n;

CERTIFICATION OF ALGORITHM 68

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AUGMENTATION was transliterated into BALGOL for the Burroughs 220, and proved successful in a number of test cases. However, the following algorithm has exactly the same effect and is considerably simpler:

real procedure Aug(x, y); value x, y; integer x, y;
begin if x<0 then l := go to L else Aug := x+y end Aug

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