

(continued from previous page)

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460 FOR T = 1 TO (N + 1)
470 J(S,T) = J(S,T) - J(R,T) * Q
480 NEXT T
490 NEXT S
500 NEXT R
510 REM END OF GAUSS-JORDAN ROUTINE
520 REM (N+1)TH COL. OF J IS SOLUTION FOR Y
530 FOR I = 1 TO N
540 X(I) = X(I) + J(I,N + 1)
550 NEXT I
560 SU = 0
570 FOR I = 1 TO N
580 SU = SU + ABS (J(I,N + 1))
590 NEXT I
600 REM PRINT X
610 PRINT "ITERATION NO. ";K
620 FOR I = 1 TO N
630 PRINT "X(";I;") = ";X(I)
640 NEXT I
650 PRINT
660 IF SU < TL THEN END
670 K = K + 1
680 IF K > IM THEN PRINT "MAX. NO. OF ITERATIONS EXCEEDED":
    END
690 GOTO 160
700 REM SUBROUTINE TO SWOP ROWS
710 REM IF PIVOT ELEMENT IS ZERO
720 REM IN GAUSS-JORDAN ROUTINE
730 REM (BUT FIRST CHECK IF RES
740 REM OF COLUMN IS ALL ZEROS)
750 W1 = 0
760 FOR II = (R + 1) TO N
770 IF W1 = 0 AND J(II,R) < > 0 THEN LET W1 = II
780 NEXT II
790 IF W1 = 0 THEN PRINT "NO UNIQUE SOLUTION FOR Y EXISTS":
    END
800 REM NOW SWOP ROW R WITH ROW W1
810 FOR II = 1 TO (N + 1)
820 W2 = J(R,II)
830 J(R,II) = J(W1,II)
840 J(W1,II) = W2
850 NEXT II
860 RETURN
1000 REM SUBROUTINE F(X)
1010 F(1) = 3 * X(1) - COS (X(2) * X(3)) - 0.5
1020 F(2) = X(1) ^ 2 - 81 * (X(2) + 0.1) ^ 2 + SIN (X(3)) + 1.06
1030 F(3) = EXP (- X(1) * X(2)) + 20 * X(3) + (31.41592654 - 3) / 3
1040 RETURN

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REFERENCES

1. A Gauss-Jordan Elimination Method Program by P E McGuire, *Byte*, August 1983.
2. *Numerical Analysis* second edition by R Burden, J Faires, A Reynolds. Published by Prindle, Weber & Schmidt, Boston 1981.

You might also like to take a look at *An Introduction to Numerical Methods for Differential Equations* by J Ortega and W Poole, published by Pitman, 1981, which discusses the Newton Method and its use in routines for solving differential equations. This book also illustrates some of the problems that can occur with the Newton method.