Some procedures in this book call for the computation of column co-factors of matrices. A possibly more computationally efficient method of computing column co-factors is illustrated and applied to the solution of systems of equations.

Given a system of equations to be solved:

AX = E	3				
X 1	X 2	Х3	X 4		В
1	1	1	1	=	- 1
0	- 1	- 1	- 1	=	2
5	5	5	3	=	- 3
- 2	- 3	- 4	- 4	12	4

The objective is to first reduce the augmented matrix above to the form:

where x denotes any number.

The reduction is carried out in the usual elimination procedure. The following steps will result in the properly reduced matrix:

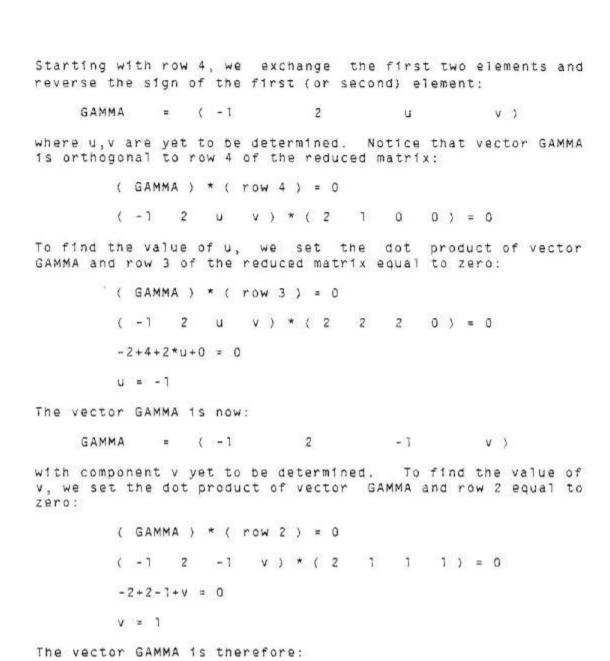
step 1: 2 \* row 1 added to row 2

step 2: -3 \* row 1 added to row 3

step 3: 4 \* row 1 added to row 4

The reduced matrix is:

We now form a four-component vector (GAMMA) which is orthogonal to rows 2-4 of the reduced matrix above.



GAMMA = (-1 2 -1 1)

The components of vector GAMMA differ from the solution vector of the system of equations to within a scale factor. This scale factor can be determined by requiring that scale factor k times the dot product of vector GAMMA and row 1 of the reduced matrix equal the right hand side of row 1:

k(GAMMA \* row 1) = -1
k(-1 2 -1 1) \* (1 1 1 1) = -1
k = -1

Applying the scale factor k to the components of vector GAMMA gives the solution vector to the system of equations whose components are:

X1 = 1

X2 = -2

X3 = 1

X4 = -1

The components of vector GAMMA are equivalent to the column co-factors to within a scale factor. For large problems, the computation of the GAMMA vector components as illustrated in this example may be faster then computing them by the column co-factor technique.