Tutorials and worked examples for simulation, curve fitting, statistical analysis, and plotting.
http://www.simfit.org.uk

Linear equations of the form $Ax = b$ can be solved uniquely only if the matrix is square and nonsingular.

Under such circumstances SIMFIT provides a procedure to solve the following system

$$Ax = b$$
$$x = A^{-1}b$$

to high accuracy, i.e. given a n by n full rank matrix A and a n by 1 vector b, to calculate an n by 1 vector x satisfying the above equations.

From the main SIMFIT menu choose [Statistics] then [Numerical analysis] and open the procedure to solve a full rank linear system. The default test files provided to demonstrate the procedure are `matrix.tf1` and `vector.tf1` containing the following data.

$$A = \begin{pmatrix} 1.20 & 4.50 & 6.10 & 7.20 & 8.00 \\ 3.00 & 5.60 & 3.70 & 9.10 & 12.5 \\ 17.1 & 23.4 & 5.50 & 9.20 & 3.30 \\ 7.15 & 5.87 & 9.94 & 8.82 & 10.8 \\ 12.4 & 4.30 & 7.70 & 8.95 & 1.60 \end{pmatrix}$$

$$b = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{pmatrix}$$

The following table will be output giving the results.

Solution to $Ax = b$ where the square matrix A is:
Test file `matrix.tf1`: arbitrary 5 by 5 matrix
and the vector b is:
Test file `vector.tf1`: Vector with components 1, 2, 3, 4, 5

RHS vector b	Solution x
1.0000000E+00	4.3984686E-01
2.0000000E+00	-2.1749733E-01
3.0000000E+00	7.8959766E-02
4.0000000E+00	-4.2703888E-02
5.0000000E+00	1.5959190E-01

The data set consisting of A and b can be varied interactively but error messages will be output under the following conditions.

1. A and b have inconsistent dimensions
2. A is singular
3. The LU factorization failed
4. The system is very ill-conditioned

Under these circumstances a meaningful unique solution cannot be obtained although various other approaches using the pseudo inverse or other techniques may be used to obtain more insight.