



It is often useful to examine the determinant, inverse, eigenvalues, and eigenvectors of a nonsingular square matrix. To do this from the main SIMFIT menu choose [Statistics] then [Numerical analysis] and select the option to calculate the determinant, etc.

The default test file `matrix.tf1` contains an arbitrary 5 by 5 matrix *A* as follows.

| Matrix A | | | | |
|----------|------|------|------|------|
| 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 |

Analysis of matrix *A* then yielded the following results for the determinant and inverse.

The estimated determinant = 4.4833699E+04

The estimated inverse matrix A^{-1}

| | | | | |
|----------------|----------------|----------------|----------------|----------------|
| -2.4109851E-01 | 6.2912193E-02 | 4.4392110E-04 | 1.0122985E-01 | 2.9773962E-02 |
| 8.5852748E-02 | -4.4069117E-02 | 5.2547695E-02 | -1.9963429E-02 | -5.8600243E-02 |
| 1.1817858E-01 | -1.7354437E-01 | -5.5370008E-03 | 1.1957082E-01 | -3.0760472E-02 |
| 2.2291097E-01 | 6.7828265E-02 | -1.9731089E-02 | -2.5804239E-01 | 1.3801828E-01 |
| -1.7785844E-01 | 8.6634195E-02 | -7.6447234E-03 | 1.3711034E-01 | -7.2265052E-02 |

The eigenvalues and eigenvectors of matrix *A* were also estimated as shown next.

| Eigenvalues | Real Part | Imaginary Part |
|-------------|----------------|----------------|
| | 3.8861300E+01 | 0.0000000E+00 |
| | -8.3436467E+00 | 0.0000000E+00 |
| | -2.7508195E+00 | 7.2563904E+00 |
| | -2.7508195E+00 | -7.2563904E+00 |
| | -2.2960146E+00 | 0.0000000E+00 |

Eigenvector columns (real parts only)

| | | | | |
|----------------|----------------|----------------|----------------|----------------|
| -3.1942365E-01 | -3.4409440E-01 | -1.3613072E-01 | -1.3613072E-01 | -3.5397608E-01 |
| -3.7703253E-01 | -7.1957517E-02 | -5.0496235E-02 | -5.0496235E-02 | 6.2281655E-02 |
| -6.0200219E-01 | 7.8212108E-01 | 8.0288388E-01 | 8.0288388E-01 | -1.3074000E-01 |
| -4.8975712E-01 | -4.4618971E-01 | -2.6270288E-01 | -2.6270288E-01 | 7.8507480E-01 |
| -3.9184988E-01 | 2.5616894E-01 | -2.1155646E-01 | -2.1155646E-01 | -4.8722330E-01 |

Eigenvector columns (imaginary parts only)

| | | | | |
|---------------|---------------|----------------|----------------|---------------|
| 0.0000000E+00 | 0.0000000E+00 | -7.5604855E-02 | 7.5604855E-02 | 0.0000000E+00 |
| 0.0000000E+00 | 0.0000000E+00 | 3.9888409E-01 | -3.9888409E-01 | 0.0000000E+00 |
| 0.0000000E+00 | 0.0000000E+00 | 0.0000000E+00 | 0.0000000E+00 | 0.0000000E+00 |
| 0.0000000E+00 | 0.0000000E+00 | -1.9106206E-01 | 1.9106206E-01 | 0.0000000E+00 |
| 0.0000000E+00 | 0.0000000E+00 | -1.3855601E-01 | 1.3855601E-01 | 0.0000000E+00 |

Error messages are output if the matrix supplied for analysis is not square or appears to be singular.