Ex: The following Matlab® code shows how to diagonalize a matrix A:

$$A = S\Lambda S^{-1}$$

where

S has eigenvectors as its columns

Λ is diagonal with eigenvalues on its diagonal

```
syms a b c d
syms A S D

A = [a, b; c, d]
A =
[ a, b]
[ c, d]

[V,D] = eig(A)
V =
[ -(-1/2*a+1/2*d-1/2*(a^2-2*a*d+d^2+4*b*c)^(1/2))/c, -(-
1/2*a+1/2*d+1/2*(a^2-2*a*d+d^2+4*b*c)^(1/2))/c]
[                                                 1,
1]
D =
[    1/2*a+1/2*d+1/2*(a^2-2*a*d+d^2+4*b*c)^(1/2),
0]
[                                                 0,
1/2*a+1/2*d-1/2*(a^2-2*a*d+d^2+4*b*c)^(1/2)]

Snum = [-1,1;1,0]'
Snum =
    -1     1
     1     0

Dnum = [2, 0; 0, 3]
Dnum =
     2     0
     0     3

Anum = Snum * Dnum * inv(Snum)
Anum =
     3     1
     0     2

[Vnum,Dnum] = eig(Anum)
Vnum =
             1     -0.70711
             0      0.70711
Dnum =
     3     0
     0     2
```