

PROGRAM : EVAL

AUTHOR : Jan Zijlstra, MTSU.

PURPOSE : to compute the eigenvalues and eigenvectors of a real matrix A.

PLATFORM: Texas Instruments TI 82/83 graphing calculator

DEFINITION: An eigenvector of a matrix A is a vector which, when multiplied by A, yields a scalar multiple (the *eigenvalue*, λ) of itself: $AK=\lambda K$

Input : entries of the real constant matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$,

Output: the eigenvalues λ_1 and λ_2 , and the corresponding eigenvectors K_1 and K_2

PROGRAM EVAL

Command Locations

```
:Prompt A           Prompt: prgm ctl
:Prompt B
:Prompt C
:Prompt D
:(A+D)/2→S         →: STO
:((A+D)^2-4(AD-BC))→T
:If T>0            If: prgm ctl; >: 2nd test
:THEN              THEN: prgm ctl
:Disp "REAL EVALS" Disp: prgm I/O
:S-√T/2→L
:S+√T/2→M
:Disp L,M
:Disp "EVECTS"
:Disp {B,L-A}
:Disp {B,M-A}
:Else              =: 2nd test
:If T=0            Then: prgm ctl
:Then
:Disp "DOUBLE EVAL"
:Disp S
:Disp {S-D,C}      Else: prgm ctl
:Disp {B,S-A}
:Else
:Disp "COMPLEX EVALS"
:Disp {S,√(-T)/2}
:Disp "REAL EVEC B0"
:Disp {B,S-A}
:Disp "CPLX EVEC B1"
:Disp {0,√(-T)/2}
```