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SCILAB NO.9

Eigen Values and Eigen Vectors

PROGRAM 1: Write a scilab code to find eigen values and eigen vectors of the following matrix:

$$\begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

CODE:

```
clc
//A = [ 8 -6 2; -6 7 -4; 2 -4 3];
A=[2 -1 1; 1 2 -1; 1 -1 2]
[c,d]=spec(A);
disp("The Eigen-values of matrix A are :");
disp(spec(A));
disp("The corresponding Eigen-vectors of matrix A is :");
disp(c);
disp(d);
```

OUTPUT:

```
Scilab 6.0.2 Console

The Eigen-values of matrix A are :

  2.
  1.
  3.

The corresponding Eigen-vectors of matrix A is :

  0.5773503   2.621D-16   0.7071068
  0.5773503  -0.7071068   2.604D-16
  0.5773503  -0.7071068   0.7071068

  2.   0.   0.
  0.   1.   0.
  0.   0.   3.

-->
```

PROGRAM 2: Write a scilab code to find eigen values and eigen vectors of the following matrix:

$$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

CODE:

```
clc
A = [ 8 -8 -2; 4 -3 -2; 3 -4 1];
[c,d]=spec(A);
disp("The Eigen-values of matrix A are :");
disp(spec(A));
disp("The corresponding Eigen-vectors of matrix A is :");
disp(c);
disp(d);
```

OUTPUT:

Scilab 6.0.2 Console

```
The Eigen-values of matrix A are :

  1.
  3.
  2.

The corresponding Eigen-vectors of matrix A is :

 -0.7427814  -0.8164966  -0.8017837
 -0.557086   -0.4082483  -0.5345225
 -0.3713907  -0.4082483  -0.2672612

  1.    0.    0.
  0.    3.    0.
  0.    0.    2.

-->
```

PROGRAM 3: Write a scilab code to find the eigen values and eigen vectors of the following matrix:

$$\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

CODE:

```
clc
A = [2 2 1; 1 3 1; 1 2 2];
[c,d]=spec(A);
disp("The Eigen-values of matrix A are :");
disp(spec(A));
disp("The corresponding Eigen-vectors of matrix A is :");
disp(c);
disp(d);
```

OUTPUT:

```
Scilab 6.0.2 Console

The Eigen-values of matrix A are :

  1.
  5.
  1.

The corresponding Eigen-vectors of matrix A is :

 -0.904534    0.5773503   0.1431312
  0.3015113   0.5773503  -0.4989347
  0.3015113   0.5773503   0.8547383

  1.    0.    0.
  0.    5.    0.
  0.    0.    1.

-->
```

PROGRAM 4: Write a scilab code to find the eigen values and eigen vectors of the following matrix A

$$\begin{bmatrix} 4 & -2 \\ 1 & 1 \end{bmatrix}$$

CODE:

```
clc
A = [4 -2; 1 1];
[c,d]=spec(A);
disp("The Eigen-values of matrix A are :");
disp(spec(A));
disp("The corresponding Eigen-vectors of matrix A is :");
disp(c);
disp(d);
```

OUTPUT:

```
Scilab 6.0.2 Console

The Eigen-values of matrix A are :

  3.
  2.

The corresponding Eigen-vectors of matrix A is :

  0.8944272   0.7071068
  0.4472136   0.7071068

  3.    0.
  0.    2.

-->
```

PROGRAM 5: Write a scilab code to find the eigen values and eigen vectors of the following matrix A

$$\begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$$

CODE:

```
clc
A = [2 1 1; 2 3 2; 3 3 4];
[c,d]=spec(A);
disp("The Eigen-values of matrix A are :");
disp(spec(A));
disp("The corresponding Eigen-vectors of matrix A is :");
disp(c);
disp(d);
```

OUTPUT:

```
Scilab 6.0.2 Console

The Eigen-values of matrix A are :

  7.
  1.
  1.

The corresponding Eigen-vectors of matrix A is :

 -0.2672612  -0.8111071   0.1180346
 -0.5345225   0.3244428  -0.7586964
 -0.8017837   0.4866643   0.6406618

  7.   0.   0.
  0.   1.   0.
  0.   0.   1.

-->
```

PROGRAM 6: Write a scilab code to find the eigen values and eigen vectors of the following matrix A

$$\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

CODE:

```
clc
A = [8 -6 2; -6 7 -4; 2 -4 3];
[c,d]=spec(A);
disp("The Eigen-values of matrix A are :");
disp(spec(A));
disp("The corresponding Eigen-vectors of matrix A is :");
disp(c);
disp(d);
```

OUTPUT:

```
Scilab 6.0.2 Console

The Eigen-values of matrix A are :

  1.584D-15
  3.
  15.

The corresponding Eigen-vectors of matrix A is :

  0.3333333   0.6666667  -0.6666667
  0.6666667   0.3333333   0.6666667
  0.6666667  -0.6666667  -0.3333333

  2.982D-15   0.    0.
  0.          3.    0.
  0.          0.    15.

-->
```