

```

> # xmaple2015 only
> with(laylinalg):
> #?laylinalg
> c5s3(35); # load problem 35, Ch 5 Section 3.

```

$$A = \begin{bmatrix} 11 & -6 & 4 & -10 & -4 \\ -3 & 5 & -2 & 4 & 1 \\ -8 & 12 & -3 & 12 & 4 \\ 1 & 6 & -2 & 3 & -1 \\ 8 & -18 & 8 & -14 & -1 \end{bmatrix}$$

(1)

```

> with(LinearAlgebra):
> evs,P:=Eigenvectors(A);

```

$$evs, P := \begin{bmatrix} 3 \\ 1 \\ 1 \\ 5 \\ 5 \end{bmatrix}, \begin{bmatrix} \frac{1}{2} & \frac{3}{5} & \frac{4}{5} & 1 & 2 \\ -\frac{1}{4} & -\frac{1}{5} & -\frac{3}{5} & -\frac{1}{3} & -\frac{1}{3} \\ -1 & -\frac{4}{5} & -\frac{2}{5} & -1 & -1 \\ -\frac{1}{4} & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 \end{bmatrix}$$

(2)

```

> DD:=DiagonalMatrix(evs);

```

$$DD := \begin{bmatrix} 3 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 0 & 5 \end{bmatrix}$$

(3)

```

> P;

```

$$\begin{bmatrix} \frac{1}{2} & \frac{3}{5} & \frac{4}{5} & 1 & 2 \\ -\frac{1}{4} & -\frac{1}{5} & -\frac{3}{5} & -\frac{1}{3} & -\frac{1}{3} \\ -1 & -\frac{4}{5} & -\frac{2}{5} & -1 & -1 \\ -\frac{1}{4} & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 \end{bmatrix}$$

(4)

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> A.P-P.DD; # answer check for eigenpairs

```

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

(5)

```
> # print eigenpairs
  for i from 1 to 5 do
    printf("eigenpair %d = %d, %a\n",i,evs[i],Column(A,i)); end do;
eigenpair 1 = 3, Vector(5, [11,-3,-8,1,8])
eigenpair 2 = 1, Vector(5, [-6,5,12,6,-18])
eigenpair 3 = 1, Vector(5, [4,-2,-3,-2,8])
eigenpair 4 = 5, Vector(5, [-10,4,12,3,-14])
eigenpair 5 = 5, Vector(5, [-4,1,4,-1,-1])
```