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18BEC0629

ASSESSMENT-2

Write the MATLAB codes for the following questions:

Question 1: Find the eigenvalues and eigenvectors of the following matrix:

MATLAB Code:

```
clc
clear
A=input('Enter the Matrix:');
%Characteristic Equation
cf=poly(A);
disp('Characteristic Equations');
disp(cf);
%Eigenvalues;
EV=eig(A);
disp('Eigenvalues');
disp(EV);
%Eigenvectors;
[P D]=eig(A);
disp('Eigenvectors');
disp(P);
```

INPUT:

Enter the Matrix:[2 3 7;4 1 3;1 2 6]

OUTPUT:

Characteristic Equations

1.0000 -9.0000 -5.0000 14.0000

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Eigenvalues

9.3741

-1.4233

1.0493

Eigenvectors

-0.6916	-0.4025	-0.3178
-0.5126	0.8961	-0.8551
-0.5088	-0.1872	0.4096

Question 2: Verify Cayley-Hamilton theorem for the matrix. And hence, find A^{-1}

MATLAB Code:

```
clc
clear
A=input('Enter the Matrix:');
%Verification of Cayley-Hamilton theorem
cf=poly(A);
n=length(cf);
CHT=cf(1)*A^(n-1);
for i=2:n
CHT=CHT+cf(i)*A^(n-i);
end
disp('R.H.S of C-H Theorem:');
disp(round(CHT));
%To find the inverse
```

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```
INV=cf(1)*A^(n-2);
for i=2:n-1
INV=INV+cf(i)*A^(n-i-1);
end
INV=INV/(-cf(n));
disp('Inverse of A:')
disp(INV)
```

INPUT:

Enter the Matrix:[4 6 0;2 -1 0;0 0 -1]

OUTPUT:

R.H.S of C-H Theorem:

```
     0     0     0
     0     0     0
     0     0     0
```

Inverse of A:

```
    0.0625    0.3750         0
    0.1250   -0.2500         0
         0         0   -1.0000
```

Question 3: Diagonalize the following matrix using orthogonal transformation

MATLAB CODE:

```
clc
clear
```

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```
A=input('Enter the symetric matrix for diagonalization :');
[P D]=eig(A);
disp('Given Matrix (A) :')
disp(A)
disp('Modal Matrix (P):')
disp(P)
NP=normc(P);
disp('Normalized Modal Matrix (N):')
disp(NP)
disp('Diagonal Matrix (D=N^T*A*N) :')
DM=round(NP'*A*NP,2);
disp(DM)
```

INPUT:

Enter the symetric matrix for diagonalization :[1 5 0;5 3 2;0 2 1]

OUTPUT:

Given Matrix (A) :

1	5	0
5	3	2
0	2	1

Modal Matrix (P):

0.7140	-0.3714	0.5936
-0.6393	-0.0000	0.7690
0.2856	0.9285	0.2374

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Normalized Modal Matrix (N):

0.7140	-0.3714	0.5936
-0.6393	-0.0000	0.7690
0.2856	0.9285	0.2374

Diagonal Matrix (D=N^T*A*N) :

-3.4800	0	0
0	1.0000	0
0	0	7.4800