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**ROLL NO - 102016055**  
**BATCH - 2CS10**  
**LAB ASSIGNMENT**  
**Experiment – 6**

Q2. Determine the largest eigen-value and the corresponding eigen-vector of the following matrices using the power method. Use  $x_0 = [1,1,1]^T$  and  $\epsilon = 10^{-3}$  :

a.)

$$\begin{bmatrix} 4 & 1 & 0 \\ 1 & 20 & 1 \\ 0 & 1 & 4 \end{bmatrix}. \quad \text{Use } x_0 = [1,1,1]^T \text{ and } \epsilon = 10^{-3}$$

### Code-

```
clc;
A=input("Enter the matrix : \n");
x=input("Enter the vector : \n");
tol=input("Enter the tolerance value : \n");
it=input("Enter the number of iterations : \n");
k = zeros(1,100);
i = 1;
while i < it
    y=A*x;
    n=norm(y,inf);
    x=y/n;
    k(i)=n;
    if (i > 1)
        if (abs(k(i) - k(i-1)) < tol )
            break;
        end
    end
    i = i+1;
end
if i > it
    disp("Maximum number of iterations reached \n ");
end
fprintf("Number of iterations : ");
disp(it);
fprintf("The corresponding Eigen Vector is : \n");
disp(x);
fprintf("The dominat Eigen Value is : \n");
disp(k(i));
```

## Output –

```
Enter the matrix :  
[4 1 0;1 20 1;0 1 4]  
Enter the vector :  
[1;1;1]  
Enter the tolerance value :  
0.001  
Enter the number of iterations :  
100  
Number of iterations :      100  
  
The corresponding Eigen Vector is :  
    0.0620  
    1.0000  
    0.0620  
  
The dominant Eigen Value is :  
    20.1241
```

**b.)**

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 2 & 0 & 1 \\ 0 & 0 & 3 & 3 \\ 0 & 1 & 2 & 3 \end{bmatrix}. \quad \text{Use } x_0 = [1, 1, 0, 1]^T \text{ and } \epsilon = 10^{-3}$$

```
clc;  
A=input("Enter the matrix : \n");  
x=input("Enter the vector : \n");  
tol=input("Enter the tolerance value : \n");  
it=input("Enter the number of iterations : \n");  
k = zeros(1,100);  
i = 1;
```

```

while i < it
y=A*x;
n=norm(y,inf);
x=y/n;
k(i)=n;
    if (i > 1)
if (abs(k(i) - k(i-1)) < tol )
break;
end
    end
i = i+1;
end
if i > it
disp("Maximum number of iterations reached \n ");
end
fprintf("Number of iterations : ");
disp(it);
fprintf("The corresponding Eigen Vector is : \n");
disp(x);
fprintf("The dominat Eigen Value is : \n");
disp(k(i));

```

## Output -

```

Enter the matrix :
[1 1 0 0 ; 1 2 0 1 ; 0 0 3 3 ; 0 1 2 3]
Enter the vector :
[1 ; 1 ; 0 ; 1]
Enter the tolerance value :
0.001
Enter the number of iterations :
100
Number of iterations :    100

The corresponding Eigen Vector is :
    0.0558
    0.2564
    1.0000
    0.8673

The dominat Eigen Value is :
    5.6022

```