## MATLAB ASSIGNMENT EXP - 6 (POWER METHOD)

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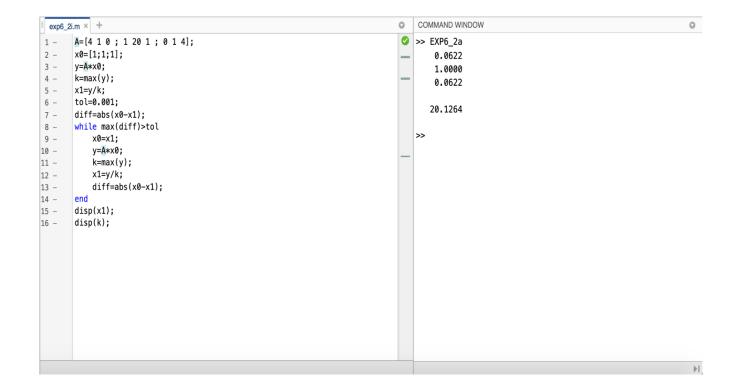
## 1. Algorithm for Power method:

- (a) Start
- (b) Define matrix A and initial guess x
- (c) Calculate y = Ax
- (d) Find the largest element in magnitude of matrix y and assign it to K.
- (e) Calculate fresh value x = (1/K) \* y
- (f) If |K(n) K(n-1)| > error, goto step c.
- (g) Stop
- 2. (a) Determine the largest eigenvalue and the corresponding eigenvector of the matrix

$$\begin{bmatrix} 4 & 1 & 0 \\ 1 & 20 & 1 \\ 0 & 1 & 4 \end{bmatrix}$$

using the power method. Use  $x^0 = [1, 1, 1]^T$  and  $\epsilon = 10^{-3}$ .

```
A=[4 1 0; 1 20 1; 0 1 4];
x0=[1;1;1];
y=A*x0;
k=max(y);
x1=y/k;
tol=0.001;
diff=abs(x0-x1);
while max(diff)>tol
  x0=x1;
  y=A*x0;
  k=max(y);
  x1=y/k;
  diff=abs(x0-x1);
end
disp(x1);
disp(k);
```



(b) Find the smallest eigenvalue and the corresponding eigenvector of the following matrix by inverse power method.

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 2 & 0 & 1 \\ 0 & 0 & 3 & 3 \\ 0 & 1 & 2 & 3 \end{bmatrix}$$

```
Use x^0 = [1, 1, 0, 1]^T and \epsilon = 10^{-3}.
Solution.
```

```
 a = [1,1,0,0;1,2,0,1;0,0,3,3;0,1,2,3]; \\  m = inv(a); \\  x0 = [1;1;0;1]; \\  Y = m*x0; \\  k = max(Y); \\  x1 = (Y/k); \\  tol = 0.001; \\  while ((min(x1-x0))>tol)||(min(x0-x1)>tol) \\  x0 = x1; \\  Y = m*x0; \\  k = max(Y); \\  x1 = (Y/k); \\ end \\ disp(k); \\ disp(x1);
```

```
0
                                                                                      COMMAND WINDOW
exp6_2i.m × exp6_2ii.m × +
                                                                                                                                                    0
                                                                                  ♠ >> exp6_2ii
 1 - a= [1,1,0,0;1,2,0,1;0,0,3,3;0,1,2,3];
 2 - m=inv(a);
                                                                                      Warning: Matrix is close to singular or badly scaled. Results
 3 -
4 -
5 -
       x0 = [1;1;0;1];
                                                                                     > In exp6_2ii (line 2)
      Y=<u>m</u>*x0;
      k=max(Y);
                                                                                        9.0072e+15
 6 -
       x1=(Y/k);
 7 –
8 –
       tol=0.001;
       while ((min(x1-x0))>tol)||(min(x0-x1)>tol)
                                                                                          1
 9 –
              x0=x1;
                                                                                          -1
10 -
11 -
              Y=<u>m</u>*x0;
                                                                                          -1
             k=max(Y);
             x1=(Y/k);
                                                                                           1
12 -
13 -
14 -
15 -
        end
        disp(k);
       disp(x1);
```