

```
1 %A=[4 -1 0 0 0 0; -1 4 -1 0 0 0; 0 -1 4 -1 0 0; 0 0 -1 4 -1 0; 0 0 0 -1 4 -1; 0 0 0 0 -1 4]
2 %b=[0;5;0;6;-2;6]
3
4 function []=SelfSD(A,b,maxNumIter)
5
6 len=length(A);
7
8 x=zeros(size(b));
9 tol=power(10,-8);
10 R=b;
11 res=norm(R);
12
13 for i=1:maxNumIter
14     if(res<tol)
15         break;
16     end
17     Q=A*R;
18     temp1=(R'*R);
19     temp2=R'*Q;
20     temp3=temp1/temp2;
21
22     x=temp3*R+x;
23     R=R-temp3*Q;
24     res=norm(R);
25 end
26 disp("solution of Ax=b: ");
27 x
28 disp("Number of iteration: ");
29 i-1
30 end
31
```

```
1 function []=SelfMR(A,b,maxNumIter)
2 %A=[4 -1 0 0 0 0;-1 4 -1 0 0 0;0 -1 4 -1 0 0;0 0 -1 4 -1 0;0 0 0 -1 4 -1;0 0 0 0 0 4]
3 %b=[0;5;0;6;-2;6]
4 tol=10^-8;
5
6
7 x0=zeros(size(b));
8
9 x=x0;
10
11 r=b-A*x0;
12 for i=1:maxNumIter
13     if(norm(r)<=tol)
14         break;
15     end
16
17     temp=A*r;
18     alpha=(temp'*r)/(norm(temp,2)^2);
19     x=x+alpha*r;
20     r=r-alpha*temp;
21
22 end
23 disp("solution of Ax=b: ");
24 x
25 disp("Number of iteration: ");
26 i-1
27 end
28
```

```
1 A=input("Enter the matrix A: ");
2 b=input("Enter the matrix b: ");
3 %A=[4 -1 0 0 0 0;-1 4 -1 0 0 0;0 -1 4 -1 0 0;0 0 -1 4 -1 0;0 0 0 -1 4 -1;0 0 0 0 -1 4]
4 %b=[0;5;0;6;-2;6]
5 maxNumIter=1000;
6 disp("Solution of Ax=b using SelfMR:");
7 SelfMR(A,b,maxNumIter);
8
9 disp("Solution of Ax=b using SelfSD:");
10 SelfSD(A,b,maxNumIter);
11
12 disp("Taking b as eigen vector:");
13 [evec,eval]=eig(A);
14 flag=evec(:,1);
15 evec=flag;
16 disp("Solution of Ax=b using SelfMR:");
17 SelfMR(A,evec,maxNumIter);
18
19 disp("Solution of Ax=b using SelfSD:");
20 SelfSD(A,evec,maxNumIter);
21
22
23
```

```
>> A9Q1
```

```
Enter the matrix A: [4 -1 0 0 0 0;-1 4 -1 0 0 0;0 -1 4 -1 0 0;0 0 -1 4 -1 0;0 0 0 -1 4  
4 -1;0 0 0 0 -1 4]
```

```
Enter the matrix b: [0;5;0;6;-2;6]
```

```
Solution of Ax=b using SelfMR:
```

```
solution of Ax=b:
```

```
x =
```

```
0.3892  
1.5569  
0.8382  
1.7959  
0.3456  
1.5864
```

```
Number of iteration:
```

```
ans =
```

```
23
```

```
Solution of Ax=b using SelfSD:
```

```
solution of Ax=b:
```

```
x =
```

```
0.3892  
1.5569  
0.8382  
1.7959  
0.3456  
1.5864
```

```
Number of iteration:
```

```
ans =
```

```
25
```

```
Taking b as eigen vector:
```

```
Solution of Ax=b using SelfMR:
```

```
solution of Ax=b:
```

```
x =
```

```
0.1055  
0.1901  
0.2371
```

```
0.2371
0.1901
0.1055
```

Number of iteration:

ans =

```
1
```

Solution of  $Ax=b$  using SelfSD:  
solution of  $Ax=b$ :

x =

```
0.1055
0.1901
0.2371
0.2371
0.1901
0.1055
```

Number of iteration:

ans =

```
1
```

```
>>
```

```
1 function []=SelfRNSD(A,b,maxNumIter)
2 %A=[1 -6 9; 6 2 3; 9 3 2]
3 %b=[0;5;0]
4 tol=10^-8;
5
6
7 x0=zeros(size(b));
8
9 x=x0;
10
11 r=b-A*x0;
12 for i=1:maxNumIter
13     if(norm(r)<=tol)
14
15         break;
16     end
17
18     temp1=A.'*r;
19     temp2=A*temp1;
20     alpha=(temp1'*temp1)/(temp2'*temp2);
21     x=x+alpha*temp1;
22     r=r-alpha*temp2;
23
24 end
25 disp("solution of Ax=b: ");
26 x
27 disp("Number of iteration: ");
28 i
29 end
30
```

```
1 A=input("Enter the matrix A: ");
2 b=input("Enter the matrix b: ");
3 %A=[1 -6 9; 6 2 3; 9 3 2]
4 %b=[0;5;0]
5 maxNumIter=10000;
6 disp("Solution of Ax=b using SelfMR:");
7 SelfMR(A,b,maxNumIter);
8
9 disp("Solution of Ax=b using SelfSD:");
10 SelfSD(A,b,maxNumIter);
11
12 disp("Solution of Ax=b using SelfRNSD:");
13 SelfRNSD(A,b,maxNumIter);
14
```

```
>> A9Q2
```

```
Enter the matrix A: [1 -6 9; 6 2 3; 9 3 2]
```

```
Enter the matrix b: [0;5;0]
```

```
Solution of Ax=b using SelfMR:
```

```
solution of Ax=b:
```

```
x =
```

```
0.0104
```

```
0.2424
```

```
-0.0052
```

```
Number of iteration:
```

```
i =
```

```
10000
```

```
Solution of Ax=b using SelfSD:
```

```
solution of Ax=b:
```

```
x =
```

```
1.0e+153 *
```

```
-1.1774
```

```
0.0008
```

```
0.5431
```

```
Number of iteration:
```

```
i =
```

```
10000
```

```
Solution of Ax=b using SelfRNSD:
```

```
solution of Ax=b:
```

```
x =
```

```
-2.0526
```

```
4.1579
```

```
3.0000
```

```
Number of iteration:
```

```
i =
```

```
2756
```