```
%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]
%b=[0;5;0;6;-2;6]

function[]=SelfSD(A,b,maxNumIter)

len=length(A);

x=zeros(size(b));
tol=power(10,-8);
R=b;
res=norm(R);

for i=1:maxNumIter
    if(res<tol)
        break;
    end
   Q=A*R;
   temp1=(R'*R);
   temp2=R'*Q;
   temp3=temp1/temp2;

   x=temp3*R+x;
   R=R-temp3*Q;
   res=norm(R);
end
disp("solution of Ax=b: ");
x
disp("Number of iteration: ");
i-1
end

```

```
function []=SelfMR(A,b,maxNumIter)
%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]
%b=[0;5;0;6;-2;6]
tol=10^-8;


x0=zeros(size(b));

x=x0;

r=b-A*x0;
for i=1:maxNumIter
    if(norm(r)<=tol)
        break;
    end

    temp=A*r;
    alpha=(temp'*r)/(norm(temp,2)^2);
    x=x+alpha*r;
    r=r-alpha*temp;

end
disp("solution of Ax=b: ");
x
disp("Number of iteration: ");
i-1
end

```

```
A=input("Enter the matrix A: ");
b=input("Enter the matrix b: ");
%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]
%b=[0;5;0;6;-2;6]
maxNumIter=1000;
disp("Solution of Ax=b using SelfMR:");
SelfMR(A,b,maxNumIter);

disp("Solution of Ax=b using SelfSD:");
SelfSD(A,b,maxNumIter);

disp("Taking b as eigen vector:");
[evec,eval]=eig(A);
flag=evec(:,1);
evec=flag;
disp("Solution of Ax=b using SelfMR:");
SelfMR(A,evec,maxNumIter);

disp("Solution of Ax=b using SelfSD:");
SelfSD(A,evec,maxNumIter);
```

```
>> 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 -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

>>
```

```
function []=SelfRNSD(A,b,maxNumIter)
%A=[1 -6 9; 6 2 3; 9 3 2]
%b=[0;5;0]
tol=10^-8;


x0=zeros(size(b));

x=x0;

r=b-A*x0;
for i=1:maxNumIter
    if(norm(r)<=tol)

        break;
    end

    temp1=A.'*r;
    temp2=A*temp1;
    alpha=(temp1'*temp1)/(temp2'*temp2);
    x=x+alpha*temp1;
    r=r-alpha*temp2;

end
disp("solution of Ax=b: ");
x
disp("Number of iteration: ");
i
end

```

```
A=input("Enter the matrix A: ");
b=input("Enter the matrix b: ");
%A=[1 -6 9; 6 2 3; 9 3 2]
%b=[0;5;0]
maxNumIter=10000;
disp("Solution of Ax=b using SelfMR:");
SelfMR(A,b,maxNumIter);

disp("Solution of Ax=b using SelfSD:");
SelfSD(A,b,maxNumIter);

disp("Solution of Ax=b using SelfRNSD:");
SelfRNSD(A,b,maxNumIter);

```

```
>> 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
```