```
%Stability of linear systems.

fprintf('4a).\n');
%(a).Does this imply that x^ is close to the exact solution x?
fprintf('No, since the residual values are not near zero, then xhat is not close to the exact solution. \n\n');

fprintf('4b).\n');
%Matrix A
A = 1./hankel(2:6,6:10);

%vector b
b = [0.882 0.744 0.618 0.521 0.447]';

%Accurate solution to the system
x = A\b

fprintf('\n');
fprintf('4c).\n');
%Obtain a condition number for A using this same software again
%condition number
C = cond(A)
fprintf('Since the Condition number of A is large then the system is ill-conditioned, therefore a small perturbation \n to the RHS can lead to large cl

fprintf('Consider a small perturbation on, db. \n');

db = [0.000002 0.000004 0.000008 0.00001 0.00007]'

R1=C*norm(db,2)/norm(b,2)

%ddx due to perturbation on the RHS
ddx = x + A\db

%Relative error
RE = norm((ddx-x),2)/norm(x,2)

fprintf('Since the relative Error,RE<=R1, and large then indeed this confirms that a very small residual\n after the system being perturbed on the RHS
```

```
4a).
No, since the residual values are not near zero, then xhat is not close to the exact solution.

4b).

x =

  -2.520000000000023
   5.040000000000505
   2.519999999998072
   7.560000000002508
 -10.080000000001057


4c).

C =

     1.535043895304634e+06

Since the Condition number of A is large then the system is ill-conditioned, therefore a small perturbation
 to the RHS can lead to large change ib the system.

Consider a small perturbation on, db.

db =

   1.0e-04 *

   0.020000000000000
   0.040000000000000
   0.080000000000000
   0.100000000000000
   0.700000000000000


R1 =

  74.051562320624924


ddx =

  -2.145300000001764
   0.551040000023523
  18.217919999913303
 -13.361039999880891
  -0.667800000054639
```

```
RE =

   2.007030225261566

Since the relative Error,RE<=R1, and large then indeed this confirms that a very small residual
 after the system being perturbed on the RHS, is big enough to allow for the solution to be as far away.
```

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