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```
format long e;
```

Question 7.a

Question 7.a

```
A = [0.550 0.423;
    0.473 0.364];

b = [0.8757;
    0.7533];

temp = A\b;

xstar = round(temp,1)
```

```
xstar =

     9.000000000000000e-01
     9.000000000000000e-01
```

Question 7.b

```
xtilde = A\b

d = xtilde - xstar

rstar = b - (A * xstar)

rtilde = b - (A * xtilde)

norm_rstar = norm(rstar)

norm_rtilde = norm(rtilde)

% A lower norm indicates better fit of the solution. As rstar is 0, it
```

```
% implies residual is minimum and its exact solution.
% Whereas, norm of rtilde specifies there is some residual and rtilde
 is
% not exact solution


xtilde =

     9.000000000000594e-01
     8.999999999999226e-01


d =

     5.939693181744587e-14
    -7.738254481637341e-14


rstar =

     0
     0


rtilde =

                          0
     1.110223024625157e-16


norm_rstar =

     0


norm_rtilde =

     1.110223024625157e-16
```

Question 7.c

```
xcap = [40.9;
          -51.1];

rcap = b - (A * xcap);

E = (1/(transpose(xcap) * xcap)) * (rcap * transpose(xcap))

lhs = round (((A + E) * xcap),1)

rhs = round(b,1)
```

```
% thus, lhs = rhs => E satisfies the relation (A+E) * xtilde = b
```

```
E =

   -3.818843049285169e-05    4.771219555463867e-05
    7.637686098574048e-05   -9.542439110932369e-05
```

```
lhs =

    9.000000000000000e-01
    8.000000000000000e-01
```

```
rhs =

    9.000000000000000e-01
    8.000000000000000e-01
```

Question 7.d

```
xcap = [40.9;
          -51.1];

 norm(xcap - xstar)

 norm(xcap - xtilde)

 % Comparing both the norms,  norm(xcap - xtilde) < norm(xcap - xstar)
 % Thus, it can be said that xcap is more closer to xtilde than xstar
```

```
ans =

    6.560487786742689e+01
```

```
ans =

    6.560487786742679e+01
```

Question 7.e

```
 rcap = b - (A * xcap)

 E = (1\(transpose(xcap) * xcap)) * (rtilde * transpose(xcap))

 norm_E = norm(E)
```

```
rcap =

   -3.999999999999670e-03
    8.000000000003227e-03


E =

                         0                         0
    1.945293015559457e-11   -2.430427215038833e-11


norm_E =

    3.113059807325556e-11
```

Question 7.f

```
xbar = (A+E)\b


xbar =

    8.999999847364767e-01
    9.000000198461888e-01
```

Question 7.g

```
norm (xbar - xcap)


ans =

    6.560487789246380e+01
```

Question 7.h

```
% Yes, it can be said that xcap is close to the exact solution of a
system
% which is close to original system. It can be said as the norm(xcap
-
% xstar) ~ norm(xcap - xtilde) which implies xcap is
% as close to xtilde as xtilde is to xstar
```

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