Homework solutions

Question 1:

The below are solutions obtained from code where

x_sol is the estimated solution for x;
cov is the covariance of the estimate;

Part a:

cov =

```
    4.0000   -2.7500
   -2.7500    2.0000
```

x_sol =

```
    0.6194
    0.4591
```

Part b

cov =

```
    0.0679   -0.0260
   -0.0260    0.1129
```

x_sol =

```
   -1.4303
    1.8791
```

Part c

cov =

```
    0.0487    0.0054
    0.0054    0.0618
```

x_sol =

-1.2201
1.5368

Question 4

The below are solutions obtained from code where

x_sol is the estimated solution for x;
covariance is the covariance of the estimate;

Part a:

covariance =

0.1938 -0.0812
-0.0812 0.1188

x_sol =

0.4504
0.4963

Part b

covariance =

0.0545 -0.0105
-0.0105 0.0828

x_sol =

-1.0134
1.2402

Part c

covariance =

```
    0.0437    0.0072
    0.0072    0.0538
```

x_sol =

```
   -1.0296
    1.2667
```

Question 5

Part a:

The below are solutions obtained from code where
x_sol_wls is the estimated solution for x from WLS;

x_sol_wls =

```
   -1.3169
    1.4368
```

Part b:

The below are solutions obtained from code where
x_sol_blue is the estimated solution for x from BLUE;
cov_blue is the covariance of the estimated solution;

cov_blue =

```
    0.0317   -0.0079
   -0.0079    0.0198
```

x_sol_blue =

-1.3169
1.4368

Part c:

The below are solutions obtained from code where
x_sol_less is the estimated solution for x from MVE with P= 100I;
covariance_less is the covariance of the estimated solution with P= 100I;

covariance_less =

0.0317 -0.0079
-0.0079 0.0198

x_sol_less =

-1.3163
1.4365

The below are solutions obtained from code where
x_sol_more is the estimated solution for x from MVE with P= 1e6*I;
covariance_more is the covariance of the estimated solution with P= 1e6*I;

covariance_more =

0.0327 -0.0086
-0.0070 0.0182

x_sol_more =

-1.3169
1.4368

Part d:

All the solutions are close to each other. Having the *e* variance of identity matrix is close to performing WLS and the variance of the model is also not affecting much because of this.

Question 6

The below are solutions obtained from code where
x_sol is the estimated solution for x from MVE;
covariance is the covariance of the estimated solution;

covariance =

0.0437	0.0072
0.0072	0.0538

x_sol =

-0.8836
1.0802