Q2(a)

```
A = [-0.005 0 0 0 0;
     0 -0.074 0 0 0;
     0 0 -0.183 0 0;
     0 0 0 -0.462 0.990;
     0 0 0 -0.999 -0.462];
B = [-0.629 0.624;
     0.055 -0.172;
     0.030 -0.108;
     -0.186 -0.139;
     -1.23 -0.056];
C = [-0.722 -0.517 0.339 -0.163 0.112;
     -0.891 0.473 0.988 0.843 0.219];

G = ss(A,B,C,[]);

s = tf('s');
Wi = eye(2)*(s+0.2)/(0.5*s+1);
Wp = eye(2)*(0.5*s+0.05)/((1+s/1e5)*(s+1e-6));
Wu = eye(2)/50;

P = [Wp -Wp*G;
     zeros(2) Wu;
     eye(2) -G];


[K2,CL,gamma] = h2syn(P,2,2);

Gunc = G*(eye(2) + Wi*[ultidyn('del1',1) 0;0 ultidyn('del2',1)]);

P_hat = [Wp -Wp*Gunc;
         zeros(2) Wu;
         eye(2) -Gunc];

N = lft(P_hat,K2);

stabmarg = robuststab(N);
mu = 1/stabmarg.LowerBound
```

```
mu = 0.2008
```

```
perfmarg = robustperf(N);
mu = 1/perfmarg.LowerBound
```

```
mu = 3.8599
```

Q2(b)

```
P = [zeros(2) zeros(2) Wi;
     -Wp*G Wp -Wp*G;
     zeros(2) zeros(2) Wu;
     -G eye(2) -G];
```

```
[Kinf,CL,gamma] = hinfsyn(prescale(ss(P)),2,2);

P_hat = [Wp -Wp*Gunc;
         zeros(2) Wu;
         eye(2) -Gunc];

N = lft(P_hat,Kinf);

stabmarg = robuststab(N);
mu = 1/stabmarg.LowerBound
```

```
mu = 0.5059
```

```
perfmarg = robustperf(N);
mu = 1/perfmarg.LowerBound
```

```
mu = 1.2275
```

Q2(c)

```
[K_mu,CLperf] = musyn(P_hat,2,2);
```

```
D-K ITERATION SUMMARY:
-----------------------------------------------------------------
                      Robust performance               Fit order
-----------------------------------------------------------------
  Iter         K Step       Peak MU       D Fit             D
    1          0.8847         0.91       0.8494            14
    2          0.8549       0.8924       0.8475             6
    3          0.9973        0.965        1.008            14
    4          0.9076       0.8915       0.8961             6

Best achieved robust performance: 0.891
```

```
N = lft(P_hat,K_mu);

stabmarg = robuststab(N);
mu = 1/stabmarg.LowerBound
```

```
mu = 0.2569
```

```
perfmarg = robustperf(N);
mu = 1/perfmarg.LowerBound
```

```
mu = 0.8906
```