Problem 1

```
% Part c

% parameters (arbitrary satisfy given assumptions ( > 0)
%syms omega_0 zeta_0 omega_e zeta_e


omega_0 = 0.1
zeta_0 = 0.2
omega_e = 0.3
zeta_e = 0.4

% constants
k1 = 4*zeta_0*omega_0 - 8
k2 = 2*omega_0^2 - 4*zeta_0*omega_0 + 6
kr = 2*omega_0^2

l1 = omega_e^2 - 6*zeta_e*omega_e + 23
l2 = 2*zeta_e*omega_e - 4

% Matrices
A = [-3 2; 1 -1]
B = [0.5; 0]
C = [1 0]

K = [k1 k2]
L = [l1; l2]

% Compute the eigenvalues to
%A_tilde = [(A - B*K), zeros(2); zeros(2), (A - L*C)]
A_tilde = [(A - B*K), B*K; zeros(2), (A - L*C)]
eig(A_tilde)
%latex(eig(A_tilde))
```

```
omega_0 =

    0.1000


zeta_0 =

    0.2000


omega_e =

    0.3000


zeta_e =

    0.4000


k1 =
```

```
    -7.9200


k2 =

     5.9400


kr =

     0.0200


l1 =

    22.3700


l2 =

    -3.7600


A =

     -3     2
      1    -1


B =

     0.5000
          0


C =

      1     0


K =

    -7.9200    5.9400


L =

    22.3700
    -3.7600


A_tilde =

     0.9600   -0.9700   -3.9600    2.9700
     1.0000   -1.0000         0         0
          0         0  -25.3700    2.0000
          0         0    4.7600   -1.0000


ans =
```

```
  -0.0200 + 0.0980i
  -0.0200 - 0.0980i
 -25.7546 + 0.0000i
  -0.6154 + 0.0000i
```

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