## Contents

HW 1

```matlab
% Problem 3

Iy = 750;
Iz = 1000;
Ix = 500;
Po = 20;
deltaT = 0.1;

A = [0 0 0; 0 0 Po*(Ix - Iz)/Iy; 0 Po*(Iy - Ix)/Iz 0]

expm(A * deltaT);
```

```
A =

         0         0         0
         0         0  -13.3333
         0    5.0000         0
```

```matlab
deltaq0 = 0.1;
deltap0 = 0;
deltar0 = 0;
timeSeries = 0:deltaT:5;

for i = 1:length(timeSeries)
    State{i} = expm(A * timeSeries(i)) * [deltap0; deltaq0; deltar0];
end

StateVector = cell2mat(State)';

figure(1)
subplot(3,1,1)
plot(timeSeries, StateVector(:,1))
xlabel('Time (sec)')
ylabel('\Delta p')
grid on

subplot(3,1,2)
plot(timeSeries, StateVector(:,2))
xlabel('Time (sec)')
ylabel('\Delta q')
grid on

subplot(3,1,3)
plot(timeSeries, StateVector(:,3))
xlabel('Time (sec)')
ylabel('\Delta r')
grid on
```
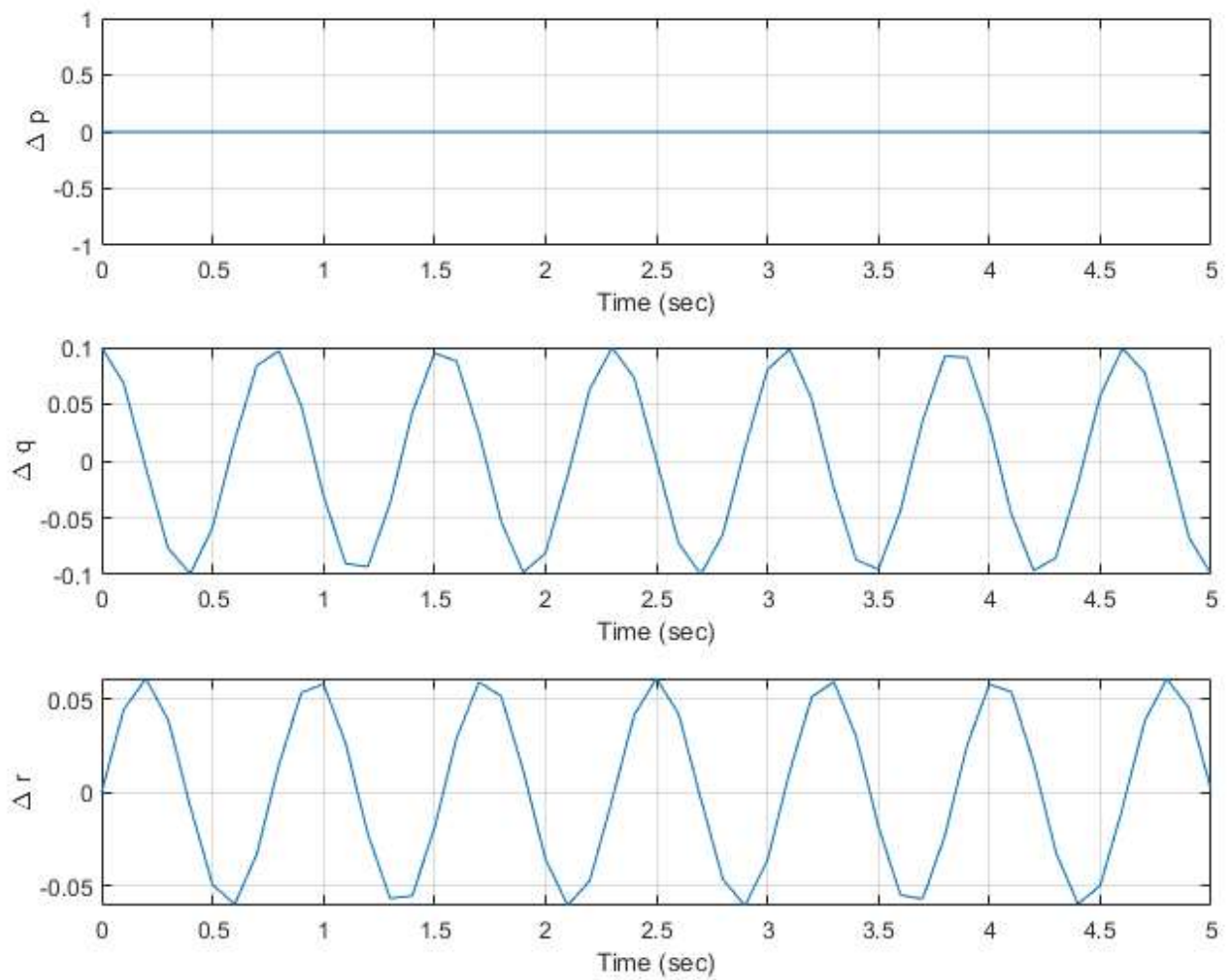
Probelm 2

```
A = [0 1 0 0; -2 0 1 0; 0 0 0 1; 1 0 -2 0];
T = [1 0 -1 0; 0 1 0 -1; 1 0 1 0; 0 1 0 1];
B = [0 0; -1 0; 0 0; 1 1];
C = [1 0 0 0; 0 0 1 0];

Atilde = T*A*inv(T)

Btilde = T*B

Ctilde = C*inv(T)
```

```
Atilde =

     0     1     0     0
    -3     0     0     0
     0     0     0     1
     0     0    -1     0


Btilde =

     0     0
```

```
        -2      -1
         0       0
         0       1


  Ctilde =

     0.5000          0    0.5000          0
    -0.5000          0    0.5000          0
```