Table of Contents

Part a

in the comand space:

```
%syms x(t) t
%Dx= diff(x,t);
%D2x= diff(Dx,t);
%xeq= D2x+(0.8*x) == cos(t)

%xeq(t) =

%(4*x(t))/5 + diff(x(t), t, t) == cos(t)

 %eqLT=laplace(xeq)

%eqLT =

%s^2*laplace(x(t), t, s) - s*x(0) - subs(diff(x(t), t), t, 0) +
 (4*laplace(x(t), t, s))/5 == s/(s^2 + 1)

%syms Fs
%eqLT= subs( eqLT, laplace(x), Fs)

%eqLT =

%Fs*s^2 - x(0)*s + (4*Fs)/5 - subs(diff(x(t), t), t, 0) == s/(s^2 + 1)

%X= solve( eqLT, Fs)

%X =

%(s*x(0) + s/(s^2 + 1) + subs(diff(x(t), t), t, 0))/(s^2 + 4/5)

%x_soln= ilaplace(X)

%x_soln =

%5*cos((2*5^(1/2)*t)/5) - 5*cos(t) + x(0)*cos((2*5^(1/2)*t)/5) +
 (5^(1/2)*sin((2*5^(1/2)*t)/5)*subs(diff(x(t), t), t, 0))/2

%vars = [x(0), Dx(0)];
%vals = [0,1];
%xfin= subs( x_soln, vars, vals)
```

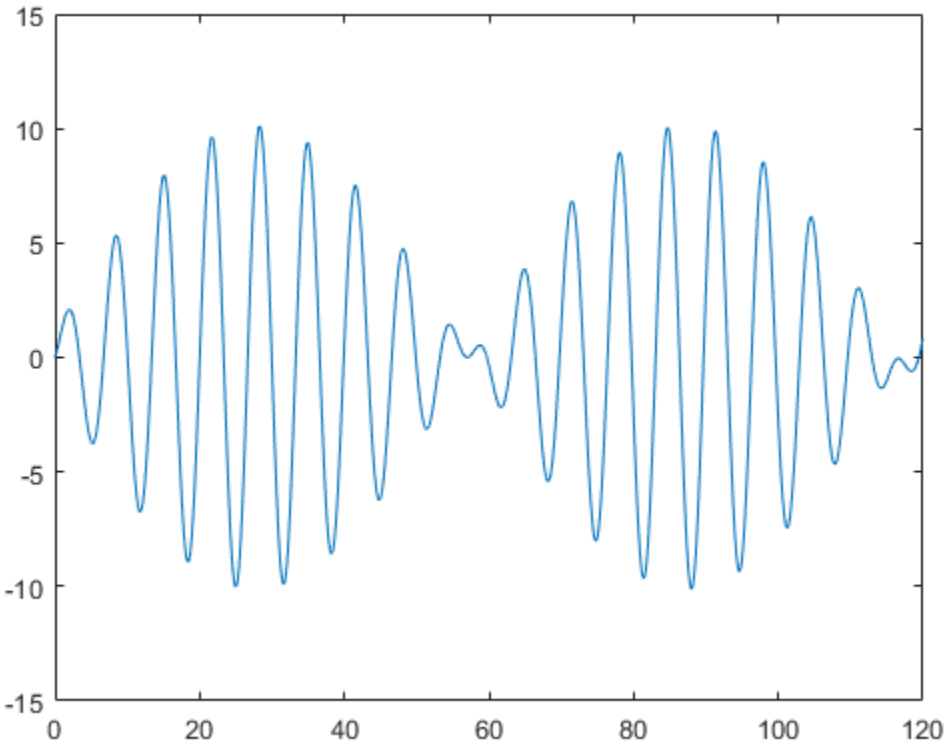
```
%xfin =

%5*cos((2*5^(1/2)*t)/5) - 5*cos(t) + (5^(1/2)*sin((2*5^(1/2)*t)/5))/2

%syms x(t) t
%Dx= diff(x,t);
%D2x= diff(Dx,t);
%xeq= D2x+x == cos(t)


%xeq(t) =

%diff(x(t), t, t) + x(t) == cos(t)

%eqLT=laplace(xeq)

%eqLT =

%s^2*laplace(x(t), t, s) - s*x(0) - subs(diff(x(t), t), t, 0) +
 laplace(x(t), t, s) == s/(s^2 + 1)

 %syms Fs
%eqLT= subs( eqLT, laplace(x), Fs)

%eqLT =

%Fs*s^2 - x(0)*s + Fs - subs(diff(x(t), t), t, 0) == s/(s^2 + 1)

%X= solve( eqLT, Fs)

%X =

%(s*x(0) + s/(s^2 + 1) + subs(diff(x(t), t), t, 0))/(s^2 + 1)

%x_soln= ilaplace(X)

%x_soln =

%x(0)*cos(t) + (t*sin(t))/2 + sin(t)*subs(diff(x(t), t), t, 0)

%vars = [x(0), Dx(0)];
%vals = [0,1];
%xfin= subs( x_soln, vars, vals)

%xfin =

%sin(t) + (t*sin(t))/2
```

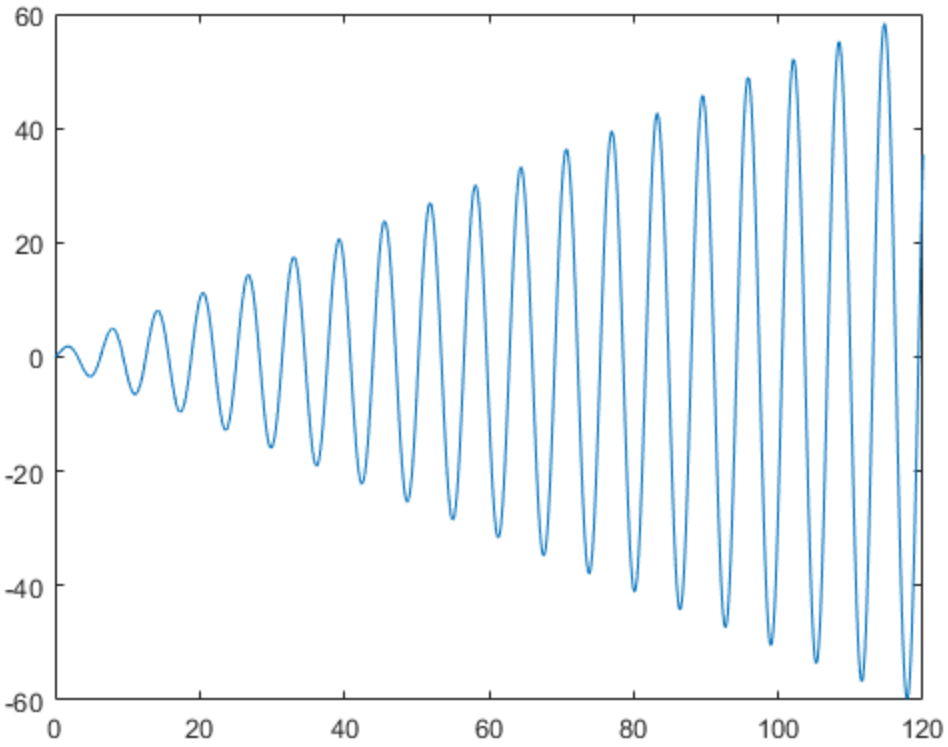
Part b

for k=1 xfin=sin(t) + (t*sin(t))/2 for k=.8 xfin= 5*cos((2*5^(1/2)*t)/5) - 5*cos(t) + (5^(1/2)*sin((2*5^(1/2)*t)/5))/2

Part c

```
t= 0:.1:120;
y= sin(t) + (t.*sin(t))/2;
x = 5*cos((2*5^(1/2)*t)/5) - 5*cos(t) +
 (5^(1/2)*sin((2*5^(1/2)*t)/5))/2;
figure(1)
plot(t,x)
figure(2)
plot(t,y)
% the spring where k=.8 is more likely to break because it represents
 a
% beat.
```





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