
Laplace Transform

Code 1:-

```
clc
clear all
syms t s y Y
a=input('enter the coefficient of second derivative f(t):');
b=input('enter the coefficient of first derivative f(t):');
c=input('enter the coefficient of y:');
f=input('enter the RHS function:');
d=input('enter the value of y(0):');
e=input('enter the value of Dy(0):');
de=a*diff(sym('y(t)'),2)+b*diff(sym('y(t)'),1)+c*sym('y(t)')-f;
eq1=laplace(de);
eq2=subs(eq1,{'laplace(y(t),t,s)','y(0)','D(y)(0)'},{Y,d,e})
eq3=collect(eq2,Y)
Y=solve(eq2,Y);
y=ilaplace(Y);
disp('The solution of the given DE is:');
disp(y)
ezplot(y)
```

Problem-1 :-

enter the coefficient of second derivative f(t):1
enter the coefficient of first derivative f(t):4
enter the coefficient of y:5
enter the RHS function:exp(t)
enter the value of y(0):1
enter the value of Dy(0):2

eq2 =

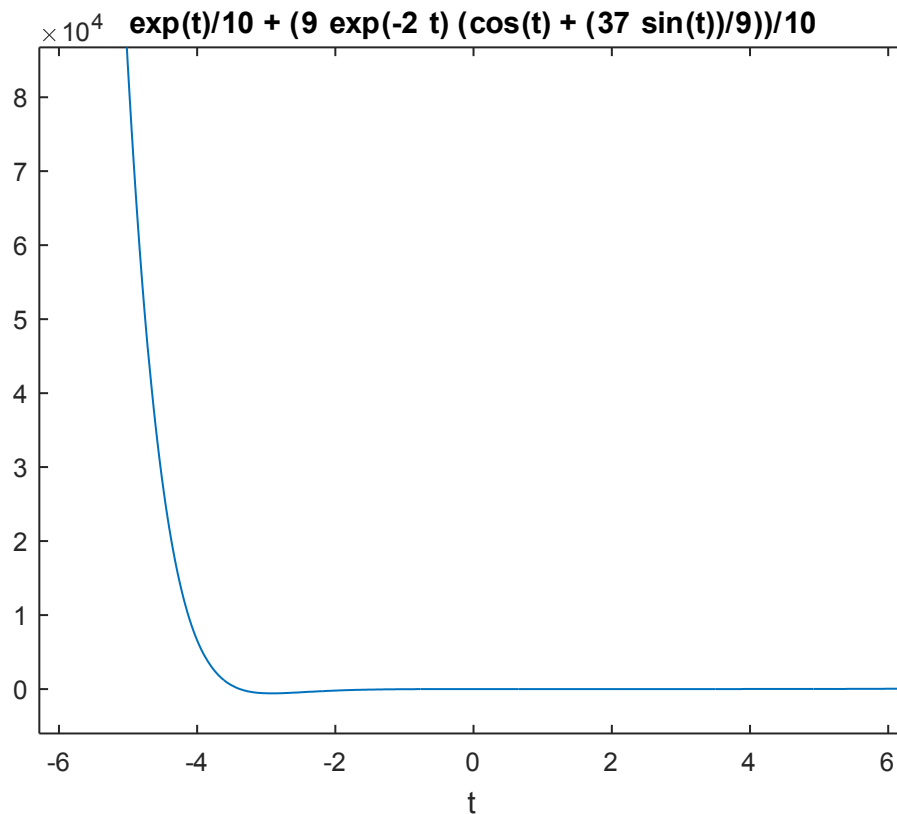
$$5*Y - s + 4*Y*s - 1/(s - 1) + Y*s^2 - 6$$

eq3 =

$$(s^2 + 4*s + 5)*Y - s - 1/(s - 1) - 6$$

The solution of the given DE is:

$$\exp(t)/10 + (9*\exp(-2*t)*(cos(t) + (37*\sin(t))/9))/10$$



Problem-2 :-

enter the coefficient of second derivative f(t):2
 enter the coefficient of first derivative f(t):0
 enter the coefficient of y:10
 enter the RHS function:3*heaviside(t-12)-5*dirac(t-4)
 enter the value of y(0):-1

enter the value of Dy(0):-2

eq2 =

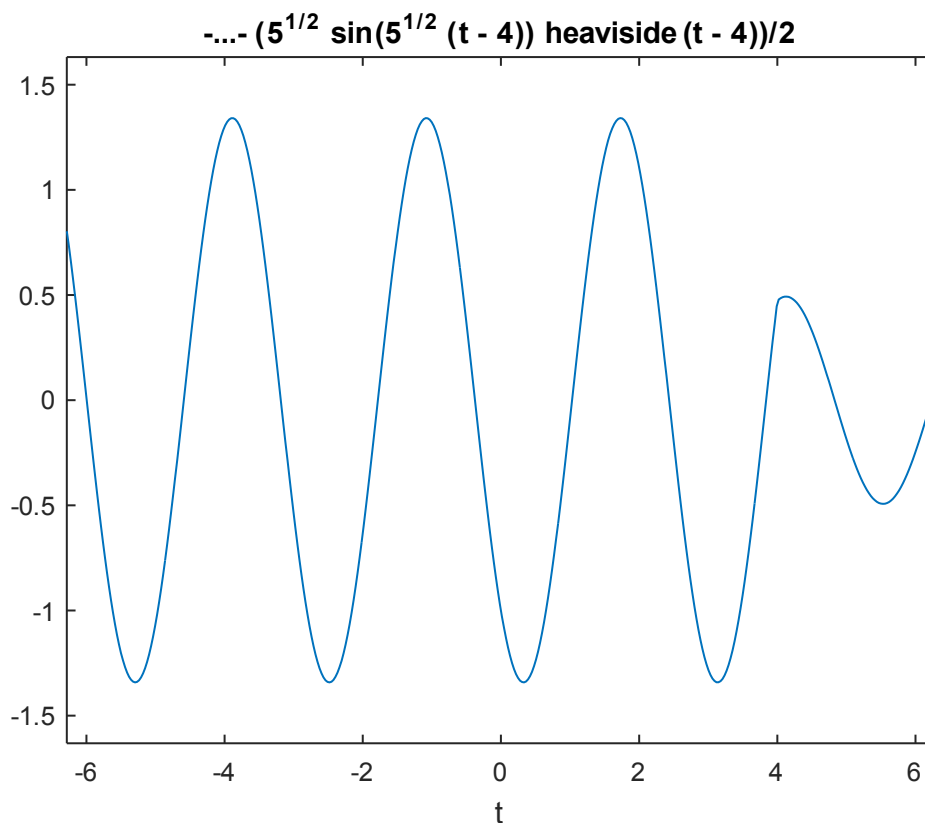
$$10*Y + 2*s + 5*\exp(-4*s) - (3*\exp(-12*s))/s + 2*Y*s^2 + 4$$

eq3 =

$$(2*s^2 + 10)*Y + 2*s + 5*\exp(-4*s) - (3*\exp(-12*s))/s + 4$$

The solution of the given DE is:

$$-\cos(5^{1/2}*t) - 3*\text{heaviside}(t - 12)*(\cos(5^{1/2}*(t - 12))/10 - 1/10) - \\ (2*5^{1/2}*\sin(5^{1/2}*t))/5 - \\ (5^{1/2}*\sin(5^{1/2}*(t - 4))*\text{heaviside}(t - 4))/2$$



Code 2:-

```
clc
clear all
syms t s y Y
b=input('enter the coefficient of first derivative f(t): ');
c=input('enter the coefficient of y: ');
f=input('enter the RHS function: ');
d=input('enter the value of y(0): ');
de=b*diff(sym('y(t)'),1)+c*sym('y(t)')-f;
eq1=laplace(de);
eq2=subs(eq1,{'laplace(y(t),t,s)','y(0)'},{Y,d});
eq3=collect(eq2,Y)
Y=solve(eq2,Y);
y=ilaplace(Y);
disp('The solution of the given DE is:');
disp(y)

ezplot(y)
```

Problem-3 :-

enter the coefficient of first derivative f(t):4
enter the coefficient of y:5
enter the RHS function:exp(t)
enter the value of y(0):1

eq2 =

$$5*Y + 4*Y*s - 1/(s - 1) - 4$$

eq3 =

$$(4*s + 5)*Y - 1/(s - 1) - 4$$

The solution of the given DE is:

$$(8*\exp(-(5*t)/4))/9 + \exp(t)/9$$

