Σήματα και Συστήματα 2019 – Εργαστήριο
Εφαρμογή 4

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Ερώτημα 1ο

```
%1
syms t s;
f=exp(-t);
laplace(f)
F=1/(1+s);
ilaplace(F)
```

```
ans =

1/(s + 1)


ans =

exp(-t)
```

Ερώτημα 2ο

```
%2
clear all
syms s t a;
f=1;
laplace(f,s)
laplace(dirac(t),s)
laplace(heaviside(t),s)
x=diff(dirac(t),3);
laplace(x,s)
x=exp(-a*t)*heaviside(t);
laplace(x,s)
```

```
ans =

1/s


ans =

1


ans =

1/s


ans =

s^3


ans =

1/(a + s)
```

Ερώτημα 3ο

```
%3
clear all
syms t s a w;
ilaplace(1/(a+s),t)
ilaplace(1/(s-i*w),t)
ilaplace(1/(s^2+w^2),t)
F=factorial(9)/(s+a)^10;
ilaplace(F,t)
F=1/(s+a)^6;
ilaplace(F,t)
```

```
ans =

exp(-a*t)


ans =

exp(t*w*1i)


ans =

sin(t*w)/w


ans =

t^9*exp(-a*t)


ans =

(t^5*exp(-a*t))/120
```

Ερώτημα 4ο

```
%4
clear all
den=[1 5 2 -8];
riz=roots(den)
syms s;
F=(s^2+3*s+1)/(s^3+5*s^2+2*s-8);
c1=limit((s-riz(1))*F,s,riz(1))
c2=limit((s-riz(2))*F,s,riz(2))
c3=limit((s-riz(3))*F,s,riz(3))
```

```
riz =

   -4.0000
   -2.0000
    1.0000


c1 =

1/2


c2 =

1/6


c3 =

1/3
```

Ερώτημα 5ο

```
%5
clear all
denom=[1 5 2 -8];
nom=[1 3 1];
[r,p,k] = residue(nom,denom)
```

```
r =

    0.5000
    0.1667
    0.3333


p =

   -4.0000
   -2.0000
    1.0000


k =

     []
```

```
syms s;
F=(s^2+3*s+1)/(s^3+5*s^2+2*s-8);
c1=limit((s-p(1))*F,s,p(1))
c2=limit((s-p(2))*F,s,p(2))
c3=limit((s-p(3))*F,s,p(3))
```

```
c1 =

1/2


c2 =

1/6


c3 =

1/3
```

```
denom=[1 5 2 -8];
nom=[1 2 3];
[r,p,k] = residue(nom,denom)
```

```
r =

    1.1000
   -0.5000
    0.4000


p =

   -4.0000
   -2.0000
    1.0000


k =

     []
```

```
syms s;
F=(s^2+2*s+3)/(s^3+5*s^2+2*s-8);
c1=limit((s-p(1))*F,s,p(1))
c2=limit((s-p(2))*F,s,p(2))
c3=limit((s-p(3))*F,s,p(3))
```

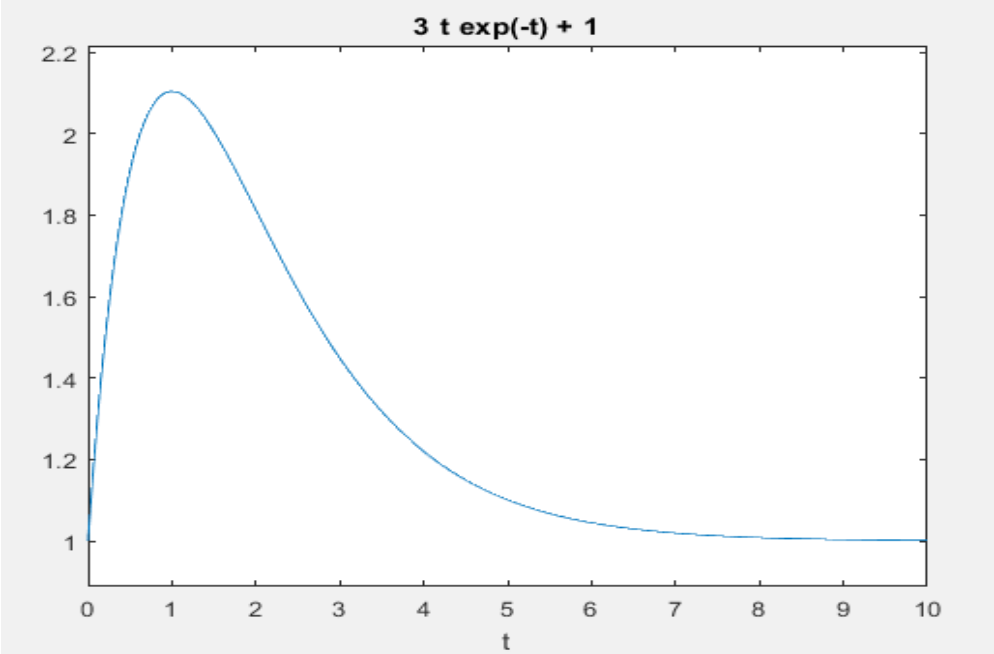
```
c1 =

11/10


c2 =

-1/2


c3 =

2/5
```

Ερώτημα 6ο

```
%6
clear all
syms s t Y
f = heaviside(t);
F = laplace(f,t,s)
%y(0)==1
Y1 = s*Y - 1;
%y'(0)=3
Y2 = s*Y1 - 3;
Sol = solve(Y2 + 2*Y1 + Y - F, Y)
sol = ilaplace(Sol,s,t)
```

```
F =

1/s


Sol =

(s + 1/s + 5)/(s^2 + 2*s + 1)


sol =

3*t*exp(-t) + 1
```

ezplot(sol,[0 10]);



Ερώτημα 6ο Δεύτερη Λύση

```
%6 enalaktikh lush
clear all
syms y(t)
Dy = diff(y,t);
ode = diff(y,t,2)+2*diff(y,t,1)-1+y(t) == 0;
cond1 = y(0) == 1;
cond2 = Dy(0) == 3;
conds = [cond1 cond2];
ySol(t) = dsolve(ode,conds)
```

```
ySol(t) =

3*t*exp(-t) + 1
```

```
ezplot(ySol,[0 10]);
```