```
% Laplace Transform for Periodic Function
clc
clear all
syms t s
T = input('Enter the period of the periodic function: ');
n = input('Enter the number of partitions in one period: ');
 fun = 0*t;

 for i=1:n

     f(i)=input('Enter the functions f(i): ');

     a(i)=input('Enter the left end point of the ith sub interval: ');

     b(i)=input('Enter the right end point of the ith sub interval: ');

     fun = fun + f(i)*(heaviside(t-a(i)) - heaviside(t-b(i)));

 end

ezplot(fun, [a(1), b(n)])

 xlabel('t-axis')

 ylabel('f(t)')

 title('Graph of the periodic function f(t)')

sum = 0;

 for i=1:n

     sum = sum + int(f(i)*exp(-s*t), t, a(i), b(i));

 end

g = (1/(1-exp(-s*T)))*sum;

 LT_f_t = simplify(g)

figure

 ezplot(LT_f_t, [a(1), b(n)])

 xlabel('s-axis')

 ylabel('F(s)')

 title('Laplace transform L[f(t)] for the periodic function f(t)')
```

```
syms t s u

 F_s=input('enter first function of s: ');

 G_s= input('enter second function of s: ');

 f_t=ilaplace(F_s)

 g_t=ilaplace(G_s)
%ILT_F_s*G_s

 f=subs(f_t,t,u)

 g= subs(g_t,t,t-u)

 ILT_F_s_G_s=int(f*g,u,0,t)
```

Output Window:

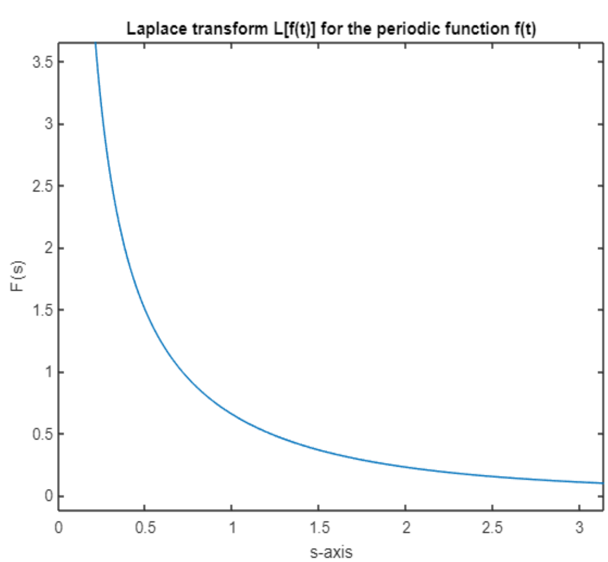
Find the Laplace Transform of the function.

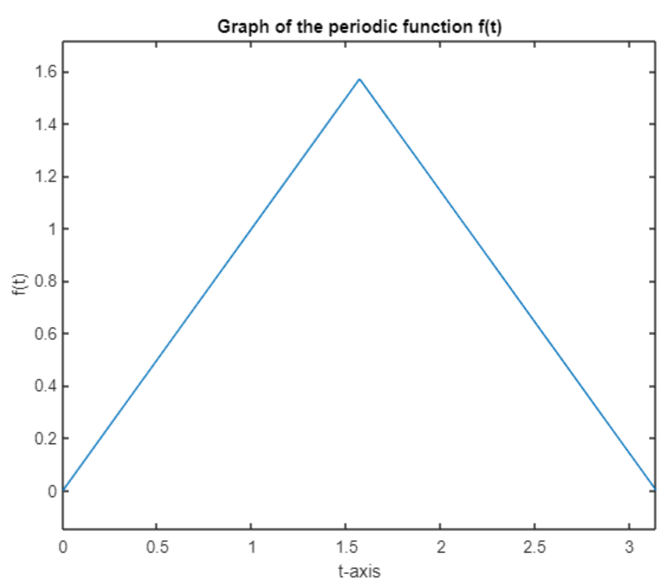
$$f(t) = \begin{cases} t\,, & 0 < t < \dfrac{\pi}{2} \\ \pi - t\,, & \dfrac{\pi}{2} < t < \pi \end{cases} \quad \text{and} \quad f(\pi + t) = f(t)$$

```
Enter the period of the periodic function:
pi
Enter the number of partitions in one period:
2
Enter the functions f(i):
t
Enter the left end point of the ith sub interval:
0
Enter the right end point of the ith sub interval:
pi/2
Enter the functions f(i):
pi-t
Enter the left end point of the ith sub interval:
pi/2
Enter the right end point of the ith sub interval:
pi

LT_f_t =

(exp((pi*s)/2) - 1)/(s^2*(exp((pi*s)/2) + 1))
```





Find the Laplace transform of the Half-wave rectifier function

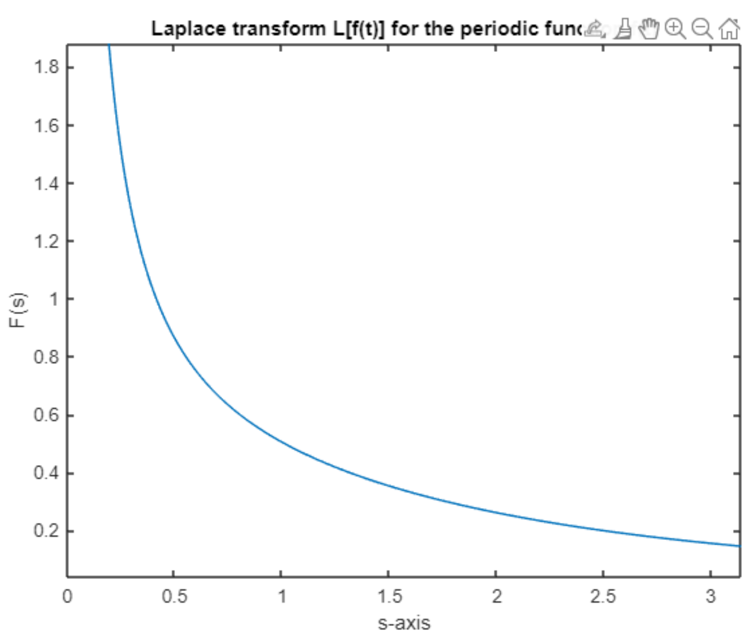
$$f(t)=\begin{cases}\sin\omega t, & 0<t<\dfrac{\pi}{\omega}\\[2mm] 0, & \dfrac{\pi}{\omega}<t<\dfrac{2\pi}{\omega}\end{cases}\quad \textit{with } f\left(t+\frac{2\pi}{\omega}\right)=f(t).$$

```
Enter the period of the periodic function:

pi
Enter the number of partitions in one period:
2
Enter the functions f(i):
sin(2*t)
Enter the left end point of the ith sub interval:
0
Enter the right end point of the ith sub interval:
pi/2
Enter the functions f(i):
0
Enter the left end point of the ith sub interval:
pi/2
Enter the right end point of the ith sub interval:
pi

LT_f_t =

-(2*(exp(-(pi*s)/2) + 1))/((s^2 + 4)*(exp(-pi*s) - 1))
```



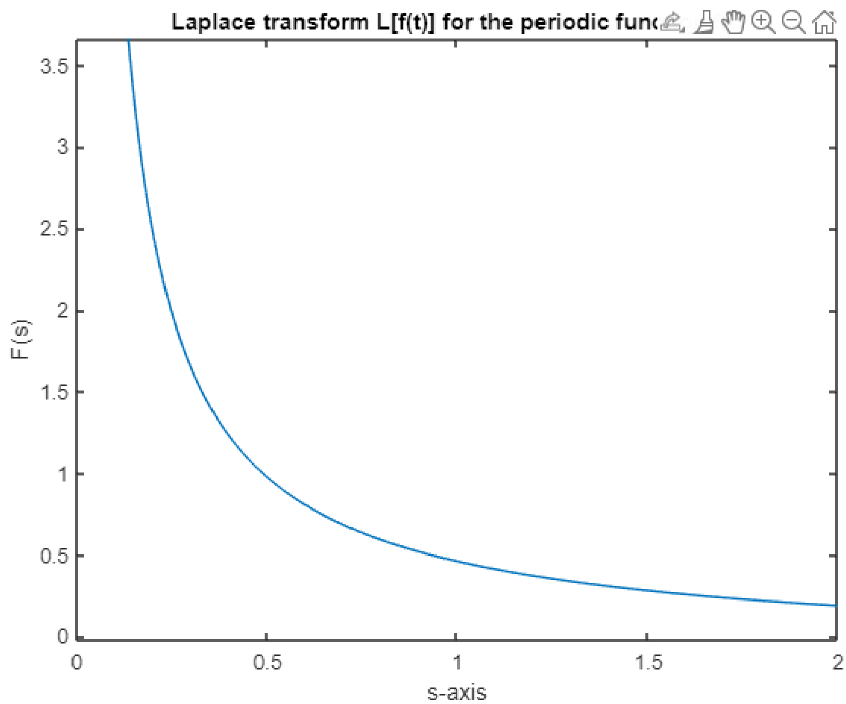
(3) $\cdot$ $f(t) = \begin{cases} t, & 0<t<1 \\ 2-t, & 1<t<2 \end{cases}$ with $f(t+2)=f(t)$

```
Enter the period of the periodic function:

2
Enter the number of partitions in one period:
2
Enter the functions f(i):
t
Enter the left end point of the ith sub interval:
0
Enter the right end point of the ith sub interval:
1
Enter the functions f(i):
2-t
Enter the left end point of the ith sub interval:
1
Enter the right end point of the ith sub interval:
2

LT_f_t =

(exp(s) - 1)/(s^2*(exp(s) + 1))
```



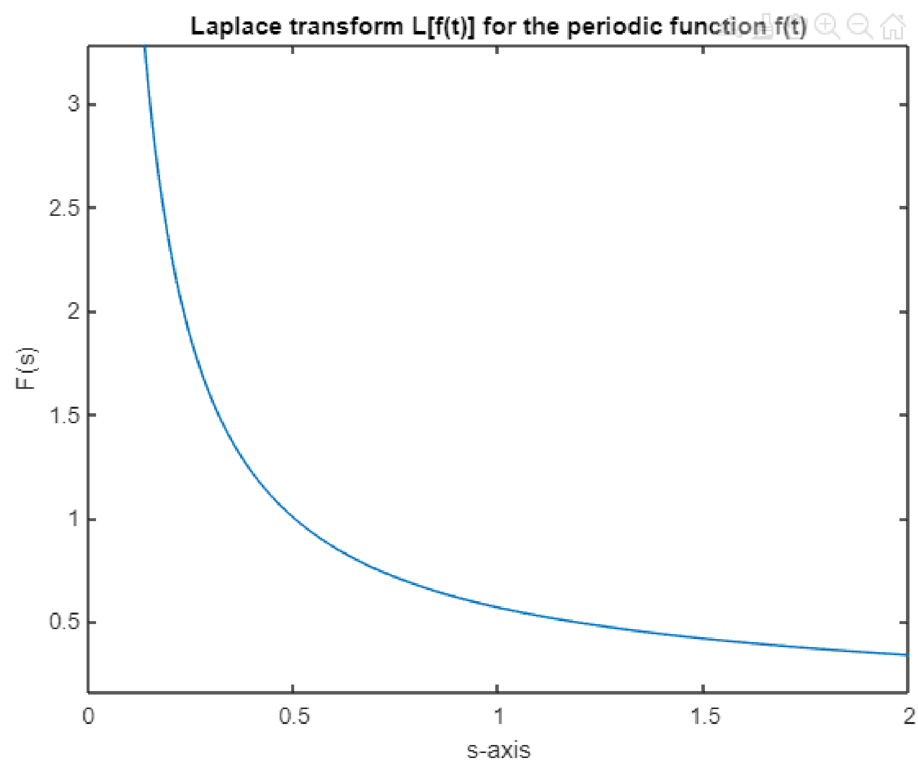
(4) $f(t) = e^{-t}, \quad 0 \le t < 2$

with $f(t+2) = f(t)$

```
Enter the period of the periodic function:
2
Enter the number of partitions in one period:
1
Enter the functions f(i):
exp(-t)
Enter the left end point of the ith sub interval:
0
Enter the right end point of the ith sub interval:
2

LT_f_t =

(exp(- 2*s - 2) - 1)/((exp(-2*s) - 1)*(s + 1))
```



$$L^{-1}\left[\frac{1}{(s^2+4)^2}\right]$$

```
enter first function of s:
1/(s^2 + 4)
enter second function of s:
1/(s^2 + 4)

f_t =

sin(2*t)/2

g_t =

sin(2*t)/2

f =

sin(2*u)/2

g =

sin(2*t - 2*u)/2

ILT_F_s_G_s =

sin(2*t)/16 + (t*(sin(t)^2 - 1/2))/4
```

$$\mathcal{L}^{-1}\left[\frac{1}{s(s^2+1)}\right]$$

```
enter first function of s:
1/s
enter second function of s:
1/(s^2 + 1)

f_t =

1


g_t =

sin(t)


f =

1


g =

sin(t - u)


ILT_F_s_G_s =

1 - cos(t)
```

$$L^{-1}\left[\frac{s^2}{(s^2+2^2)(s^2+4^2)}\right]$$

```
enter first function of s:
s/(s^2 + 4)
enter second function of s:
s/(s^2 + 16)

f_t =

cos(2*t)


g_t =

cos(4*t)


f =

cos(2*u)


g =

cos(4*t - 4*u)


ILT_F_s_G_s =

sin(4*t)/3 - sin(2*t)/6
```

$$\mathcal{L}^{-1}\left[\frac{2}{s^3(s^2+5)}\right]$$

```
enter first function of s:
2/s^3
enter second function of s:
1/(s^2 + 5)

f_t =

t^2


g_t =

(5^(1/2)*sin(5^(1/2)*t))/5


f =

u^2


g =

(5^(1/2)*sin(5^(1/2)*(t - u)))/5


ILT_F_s_G_s =

t^2/5 - (4*sin((5^(1/2)*t)/2)^2)/25
```