20BCE1548-TIRTH VISHALBHAI DAVE

EXP – 6

Q-1

Find the Laplace transform of a square wave for all t.

$$f(t)=\begin{cases}1, 0\prec t\prec \pi\\ -1, \pi\prec t\prec 2\pi\end{cases}, f(t+2\pi)=f(t)$$

CODE: -

```
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
    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')
    f(i)=input('enter the functions f(i)');
    fun = fun+f(i)*(heaviside(t-a(i))-heaviside(t-
b(i)));
end
ezplot(fun,[a(1) b(n)])
%%
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
g1=simplify(g)
figure
ezplot(g1,[0 b(n)])
```

OUTPUT: -

```
enter the period of the periodic function 2*pi

T =

   6.2832

enter the number of partitions in one period 2

n =

    2

enter the left end point of the ith sub interval0

a =

    0

enter the right end point of the ith sub intervalpi

b =

   3.1416

enter the functions f(i)1
enter the left end point of the ith sub intervalpi

a =

       0    3.1416

enter the right end point of the ith sub interval2*pi

b =

   3.1416    6.2832

enter the functions f(i)-1

sum =

-(exp(-pi*s) - 1)/s


sum =
```

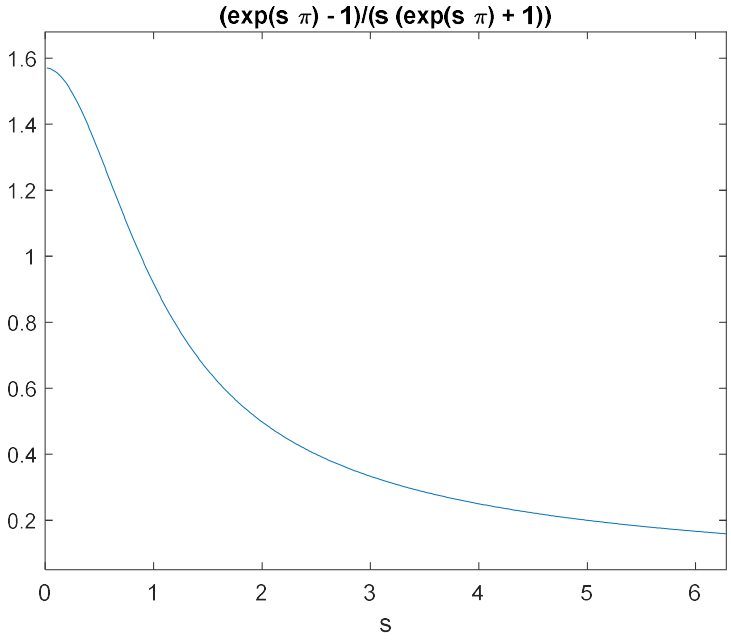
- (exp(-pi*s) - 1)/s - (exp(-2*pi*s)*(exp(pi*s) - 1))/s

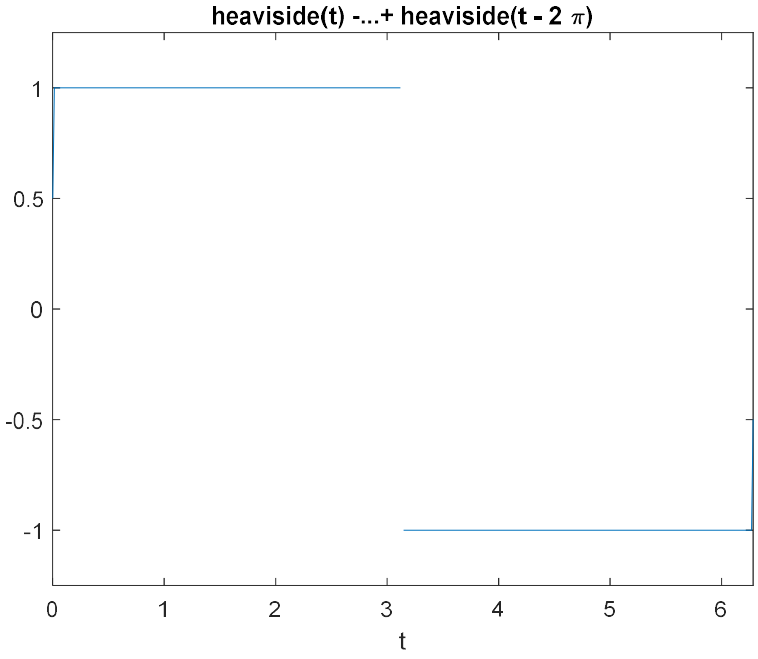
g =

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

g1 =

(exp(pi*s) - 1)/(s*(exp(pi*s) + 1))





Q-2

Find the Laplace transform $f(t)=\begin{cases}\sin t, 0 \prec t \prec \pi \\ 0, \pi \prec t \prec 2\pi\end{cases}, f(t+2\pi)=f(t)$

for all t.

CODE: -

```
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
    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')
    f(i)=input('enter the functions f(i)');
    fun = fun+f(i)*(heaviside(t-a(i))-heaviside(t-
b(i)));
end
ezplot(fun,[a(1) b(n)])
%%
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
g1=simplify(g)
figure
ezplot(g1,[0 b(n)])
```

OUTPUT: -

```
enter the period of the periodic function 2*pi

T =

   6.2832

enter the number of partitions in one period 2

n =

    2

enter the left end point of the ith sub interval 0

a =

    0

enter the right end point of the ith sub interval pi

b =

   3.1416

enter the functions f(i)sin(t)

enter the left end point of the ith sub interval pi

a =

       0    3.1416

enter the right end point of the ith sub interval 2*pi

b =

   3.1416    6.2832

enter the functions f(i)0

sum =

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

sum =

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

g =

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

g1 =

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