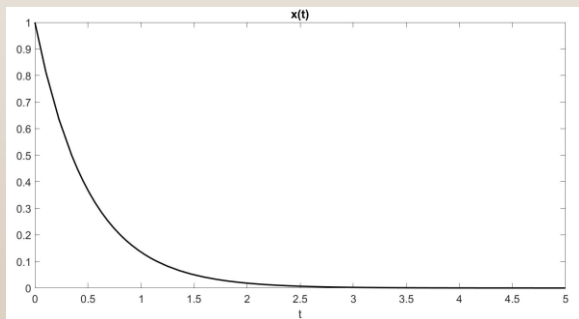


Example

- Evaluate Laplace Transform $e^{-at} u(t)$

```
syms t
a=2;
f = exp(-a*t)*heaviside(t); %expression
fplot(exp(-a*t), [0, 5]); %plot x(t) signal
title('x(t)'); xlabel('t');
Xs=laplace(f); % return X(S)
```



$$Xs = 1/(s + 2)$$

- Evaluate inverse Laplace transform

$$X(s) = \frac{2}{s+1} - \frac{1}{s+2}$$

```
syms s
f = ((2/(s+1))-(1/(s+2))); %expression
xt=ilaplace(f); % return x(t)
```

$$xt = 2 \cdot \exp(-t) - \exp(-2 \cdot t)$$

- Determine poles and zeros of the Laplace transform

$$X(s) = \frac{3s^2 + 2s - 3}{s^3 + 6s^2 + 11s + 6}$$

```
num= [ 0 3 2 -3]; %s^3, s^2, s, const
den = [1 6 11 6];
z=roots(num); % zeros
p=roots(den); % poles
```

```
z =
    -1.3874
    0.7208
p =
   -3.0000
   -2.0000
   -1.0000
```

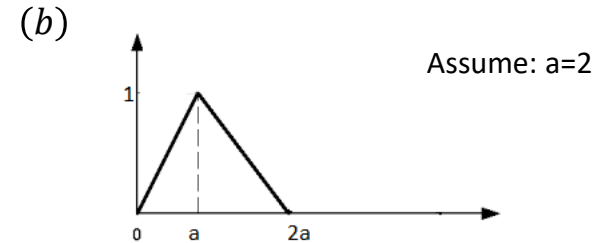
Task: Laplace transform

1. Write a MATLAB script to evaluate the Laplace transform of the following signals and then **verify** the obtained result with **analytical method**. Next, indicates the poles and zeros of the $X(s)$.

$$(a) x(t) = \frac{1}{\sqrt{3}} [\sin(\sqrt{3}t) + 2\cos(\sqrt{3}t)] e^{-t} u(t)$$

$$(c) x(t) = u(t) - 2u(t - 1) + u(t - 2)$$

$$(d) x(t) = e^{-|t|} u(t + 1)$$



3. Write a MATLAB script to evaluate the inverse Laplace transform of the following signals and then **verify** the obtained result with **analytical method**

$$(a) X(s) = \frac{5s + 3}{(s + 1)(s + 2)(s + 3)}$$

$$(b) X(s) = \frac{1}{s(s + 1)^3 (s + 2)}$$

$$(c) X(s) = \frac{(1 - se^{-s})}{s(s + 2)}$$

$$(d) X(s) = \frac{s^2 - 3}{(s + 1)(s + 2)}$$

Structure of lab report

- a) Title of the experiment → “Creation a document using MS office”
- b) Your name → XYZ, Roll-no: 1234
- c) About the experiments →
- d) Content of the experiment (diagram/programme source code/flowchart) →
- e) Your observation/what you learned →

After complementation of the LAB, document has to be uploaded in Google classroom
filename: **StudentName_rollNo**

Thank you!