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# EXPERIMENT – 8

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## Signal Analysis and Processing

*18BIS0043*

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*ECE1018*

*L21+L22*

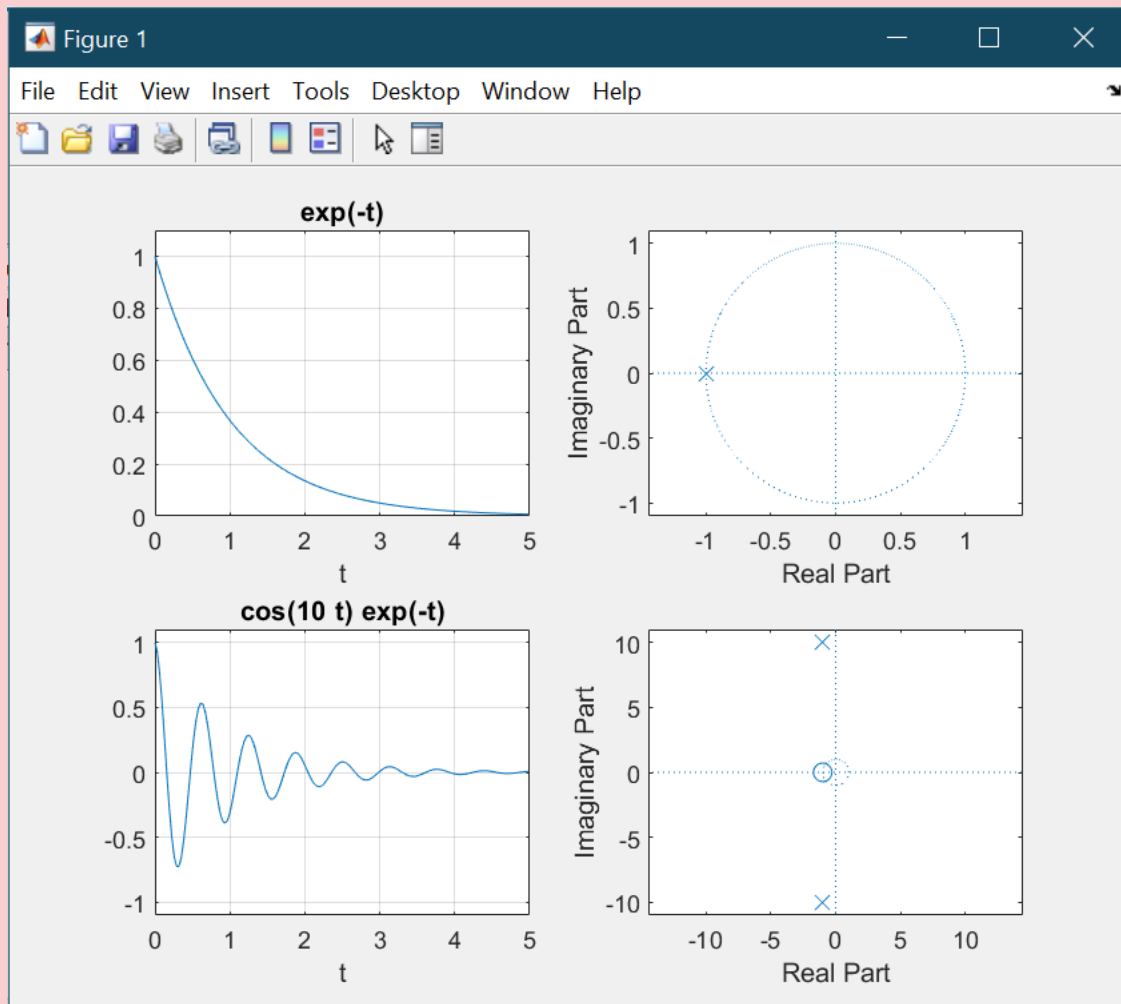
1. Use MATLAB symbolic computation to find the Laplace transform of a real exponential,  $x(t) = e^{-t} u(t)$ , and of  $x(t)$  modulated by a cosine  $y(t) = e^{-t} \cos(10t) u(t)$ . Plot the signals and the poles and zeros of their Laplace transforms.

```
syms t
x = exp(-t);
y = x*cos(10*t)
X = laplace(x);
Y = laplace(y);
figure(1)

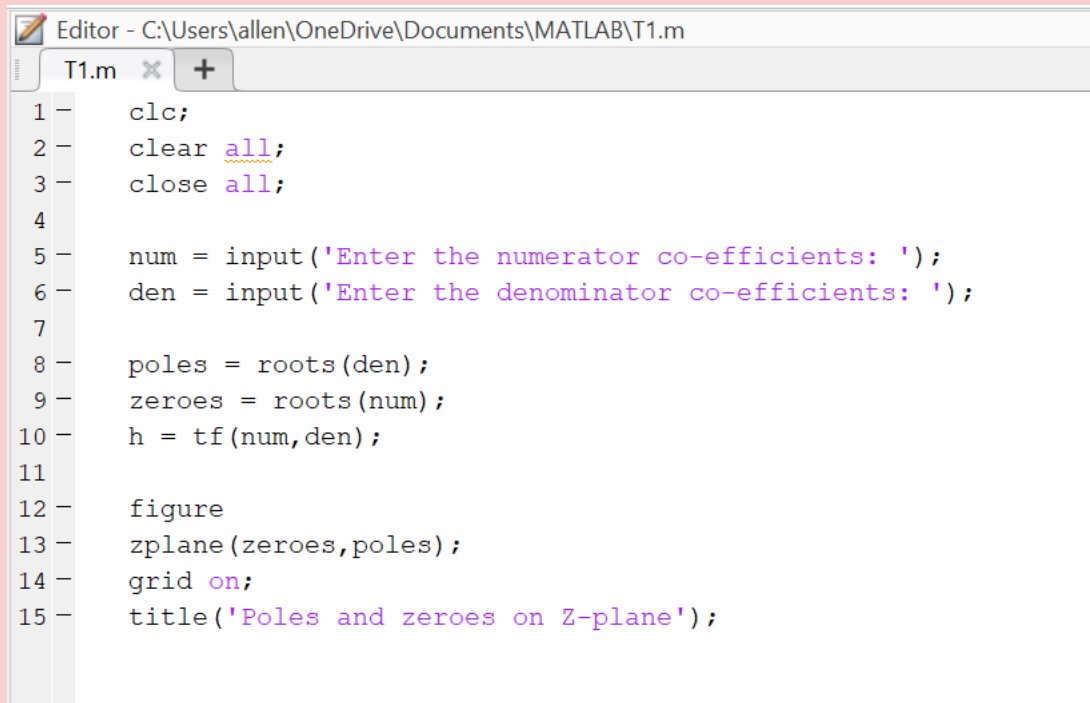
subplot(221)
ezplot (x,[0,5]);
grid
axis([0 5 0 1.1]);
title('X(t) = exp(-t)u(t)');
numx = [0 1];
denx = [1 1];
subplot(222)
splane(numx,denx)

subplot(223)
ezplot(y,[-1,5]);
grid
axis([0 5 -1.1 1.1]);
title('y(t) = cos(10t)exp(-t)u(t)')
numy = [0 1 1];
deny = [1 2 101];

subplot(224)
splane(numy,deny);
```



*The graph in the S plane was not working, hence plotted poles and zeroes using z plane function.*

**Code:**

```
Editor - C:\Users\allen\OneDrive\Documents\MATLAB\T1.m
T1.m x +
1 -   clc;
2 -   clear all;
3 -   close all;
4
5 -   num = input('Enter the numerator co-efficients: ');
6 -   den = input('Enter the denominator co-efficients: ');
7
8 -   poles = roots(den);
9 -   zeroes = roots(num);
10 -  h = tf(num,den);
11
12 -  figure
13 -  zplane(zeroes,poles);
14 -  grid on;
15 -  title('Poles and zeroes on Z-plane');
```

```
clc;
clear all;
close all;

num = input('Enter the numerator co-efficients: ');
den = input('Enter the denominator co-efficients: ');

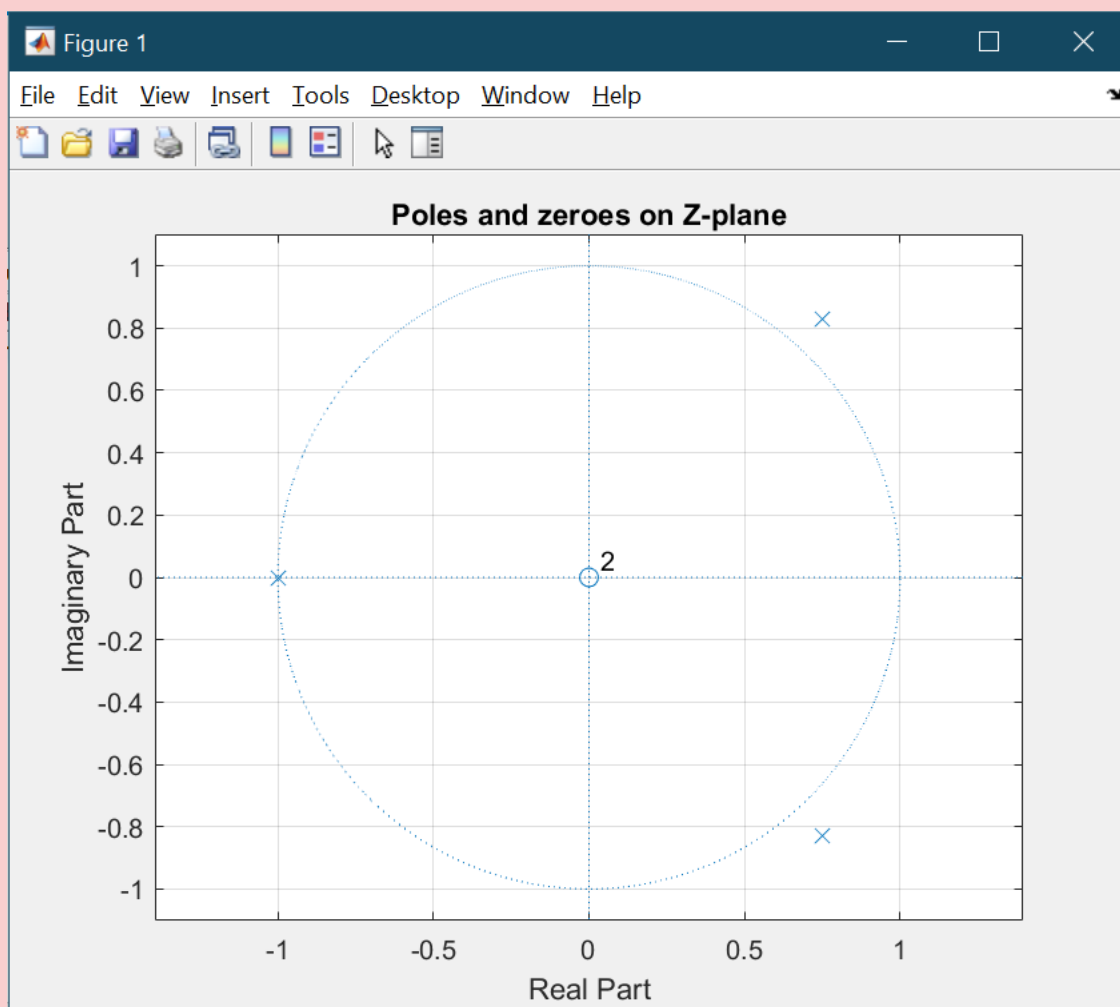
poles = roots(den);
zeroes = roots(num);
h = tf(num,den);

figure
zplane(zeroes,poles);
grid on;
title('Poles and zeroes on Z-plane');
```

## 2. a. Coefficients:

Numerator:  $[0, 0.5, 0, 0]$

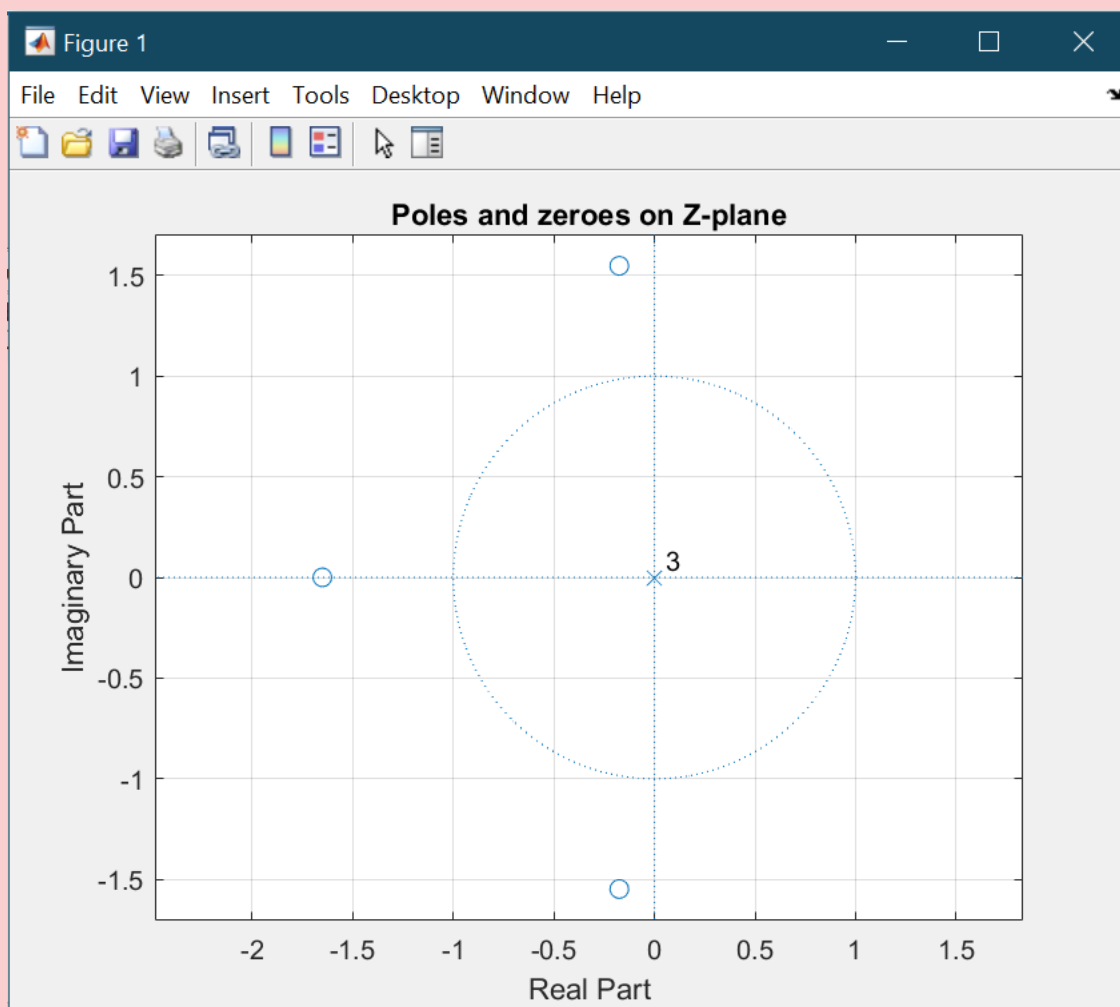
Denominator:  $[1, -0.5, -0.25, 1.25]$



***b. Coefficients:***

*Numerator: [1, 2, 3, 4]*

*Denominator: [1, 0, 0, 0]*



*c. Coefficients:**Numerator:  $[-4, 0, 3, 1]$* *Denominator:  $[0, 1, 2^{0.5}, 1]$* 