

# ELEC 4700

# Assignment 4

# Circuit Design

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## Part 1

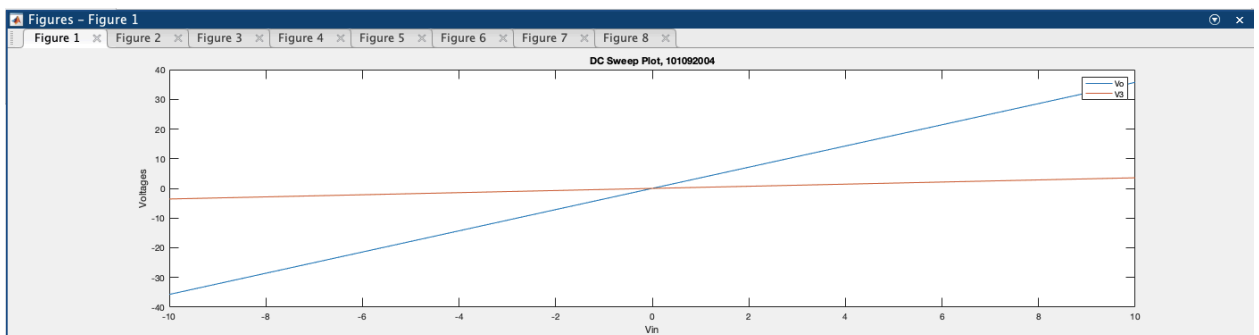
G =

1.0000	0	0	0	0	0	0
-0.5000	1.5000	-1.0000	0	0	0	0
0	1.0000	0	-1.0000	0	0	0
0	0	-1.0000	0.1000	0	0	0
0	0	0	0	-100.0000	1.0000	0
0	0	0	0.1000	-1.0000	0	0
0	0	0	0	0	-10.0000	10.0010

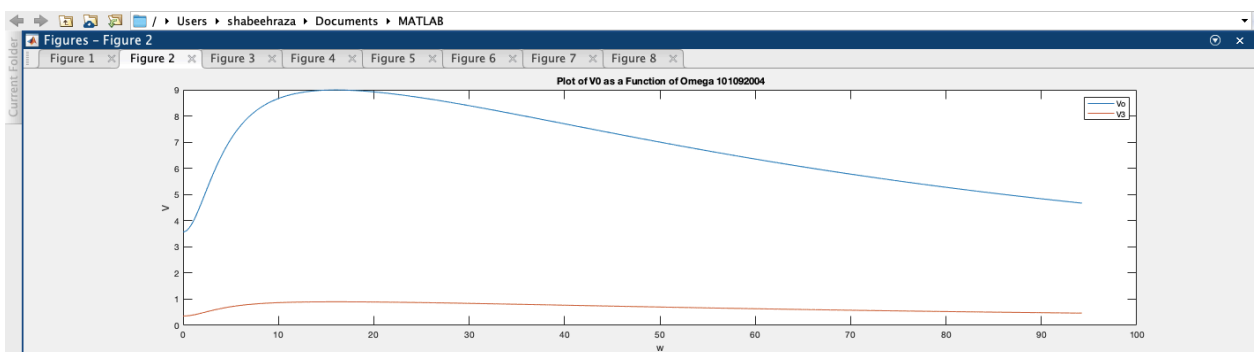
C =

0	0	0	0	0	0	0
-0.2500	0.2500	0	0	0	0	0
0	0	-0.2000	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

a)

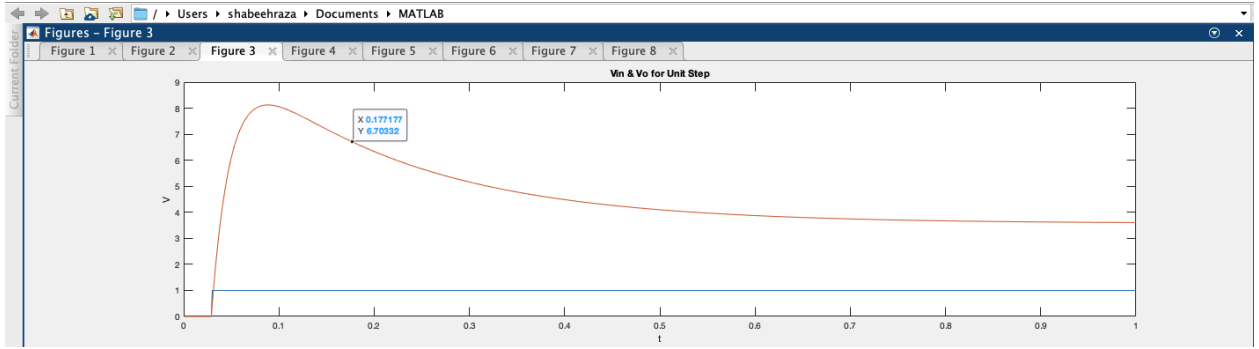


b)

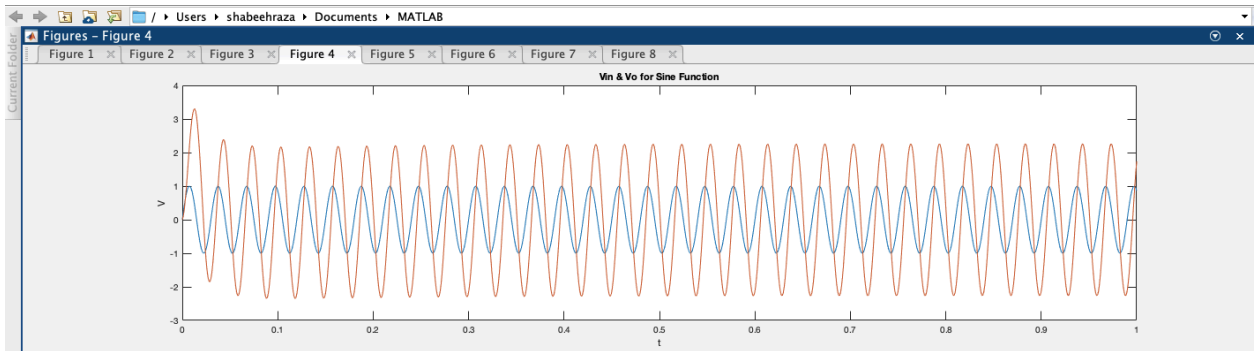


c)

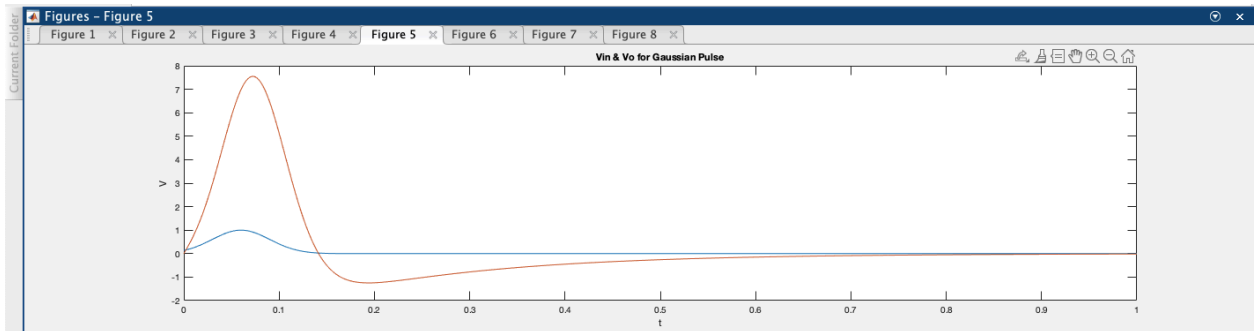
d)



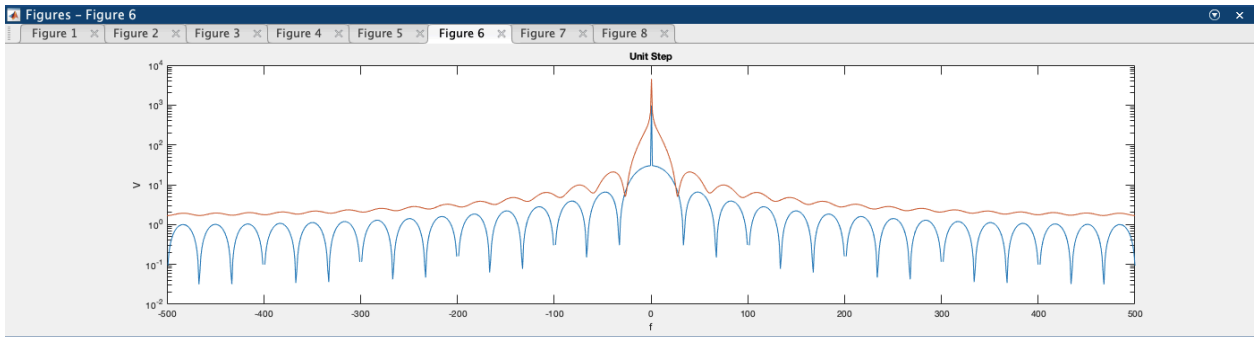
e)



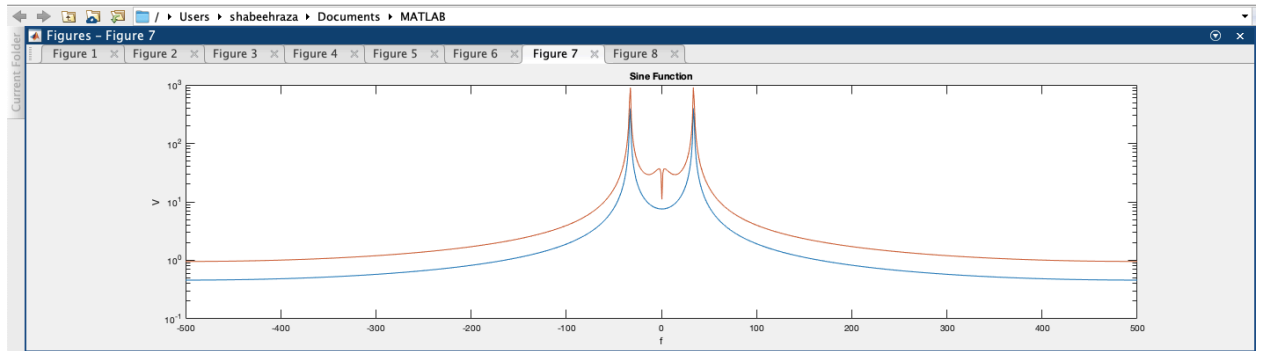
f)



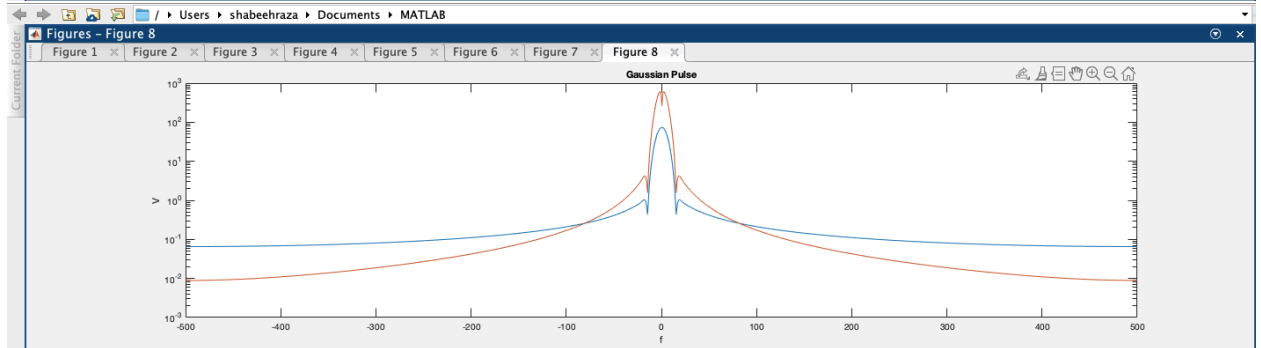
g)



h)



i)



## Part 2

Circuit with noise

The C matrix was updated

The new C matrix is

Tried to update value of C matrix from  $C_n = 0$  to  $C_n = 1e-5$  but when printing the 1 doesn't appear it's only showing up to 4 dp when I want 5 dp but I keep running into errors

```

R2 = 2;
L = 0.2;
R3 = 10;
R4 = 0.1;
alpha = 100;
R0 = 1000;
Cn = 0.00001;| %updated C matrix with noise
Vin = linspace(-10, 10,20);
G1=1/R1;
G2=1/R2;
G3=1/R3;
G4=1/R4;

```

mand Window

0	0	0	0	0	0	0
0	0	0	0	0	0	0

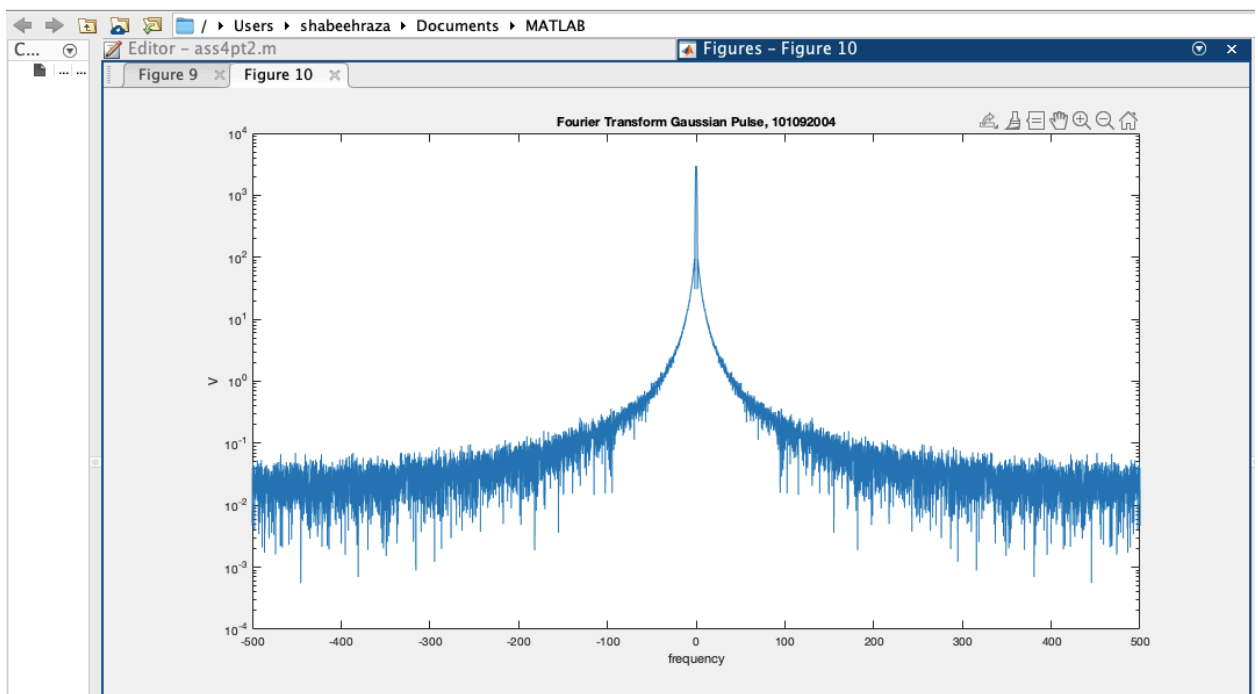
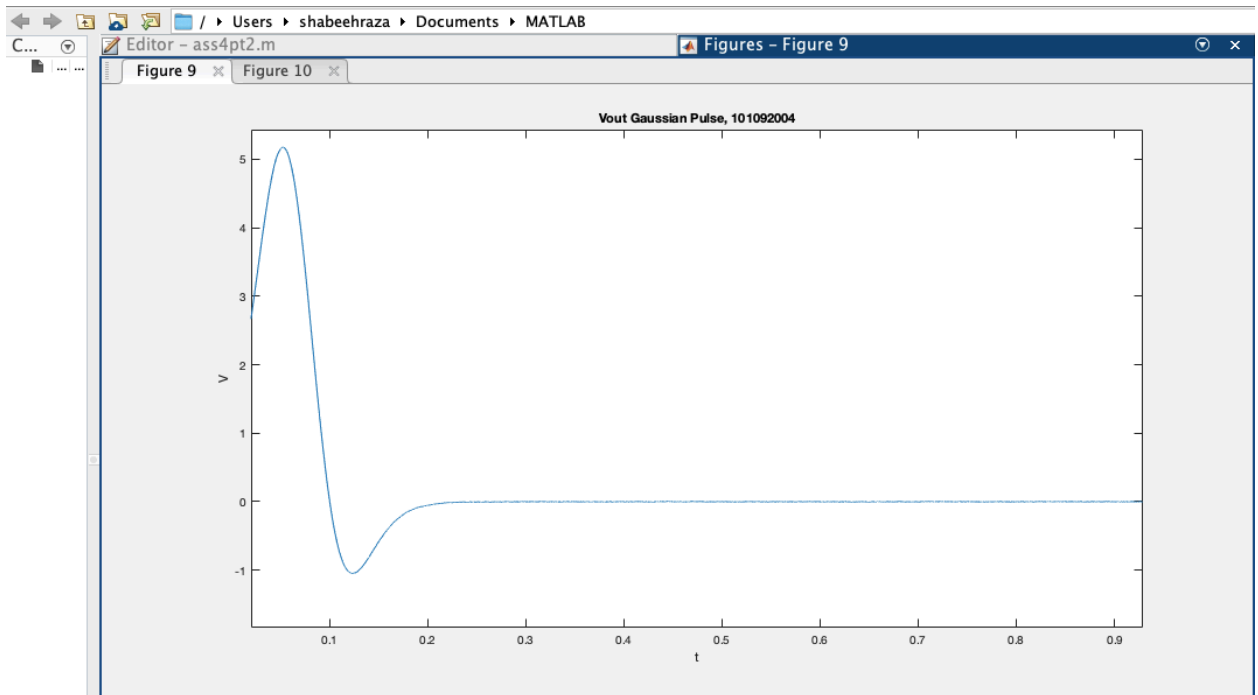
ass4pt2

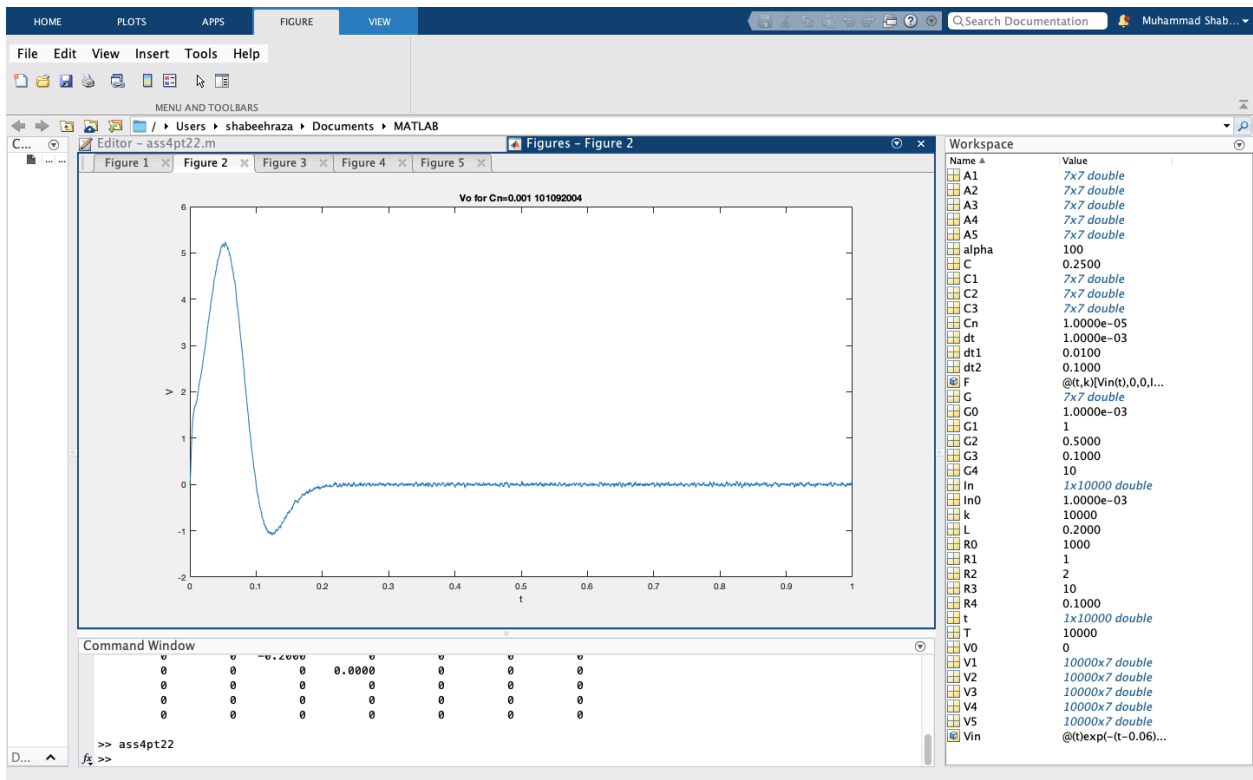
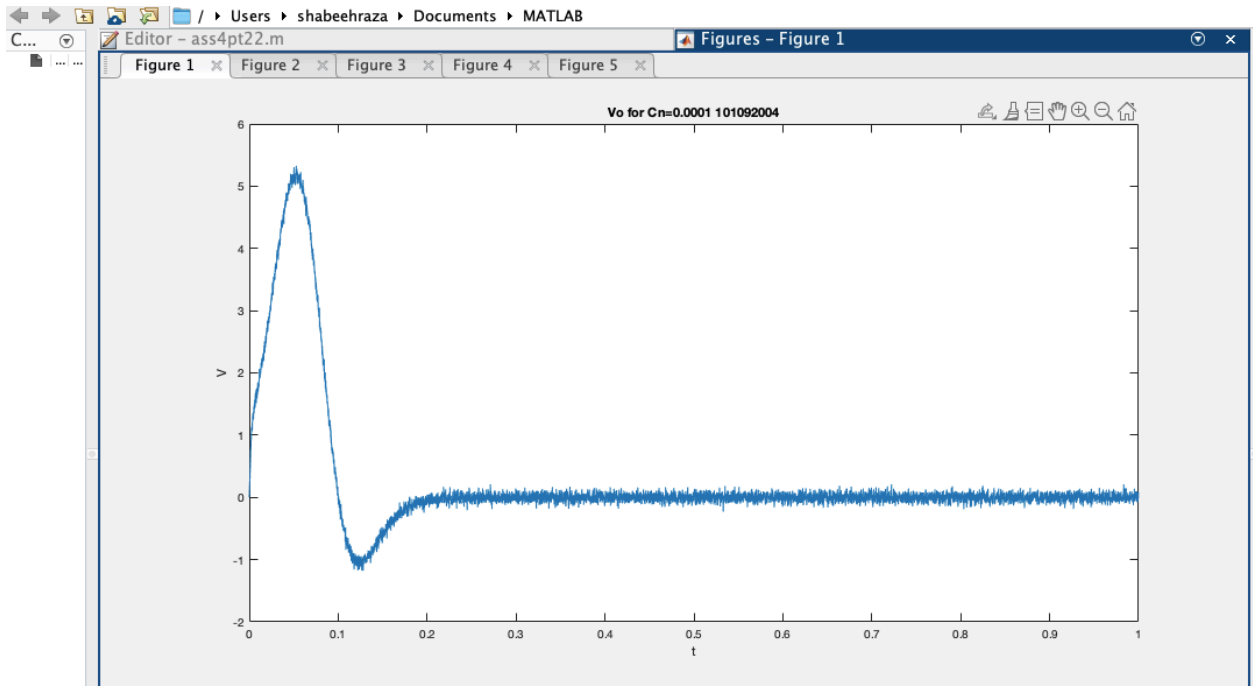
=

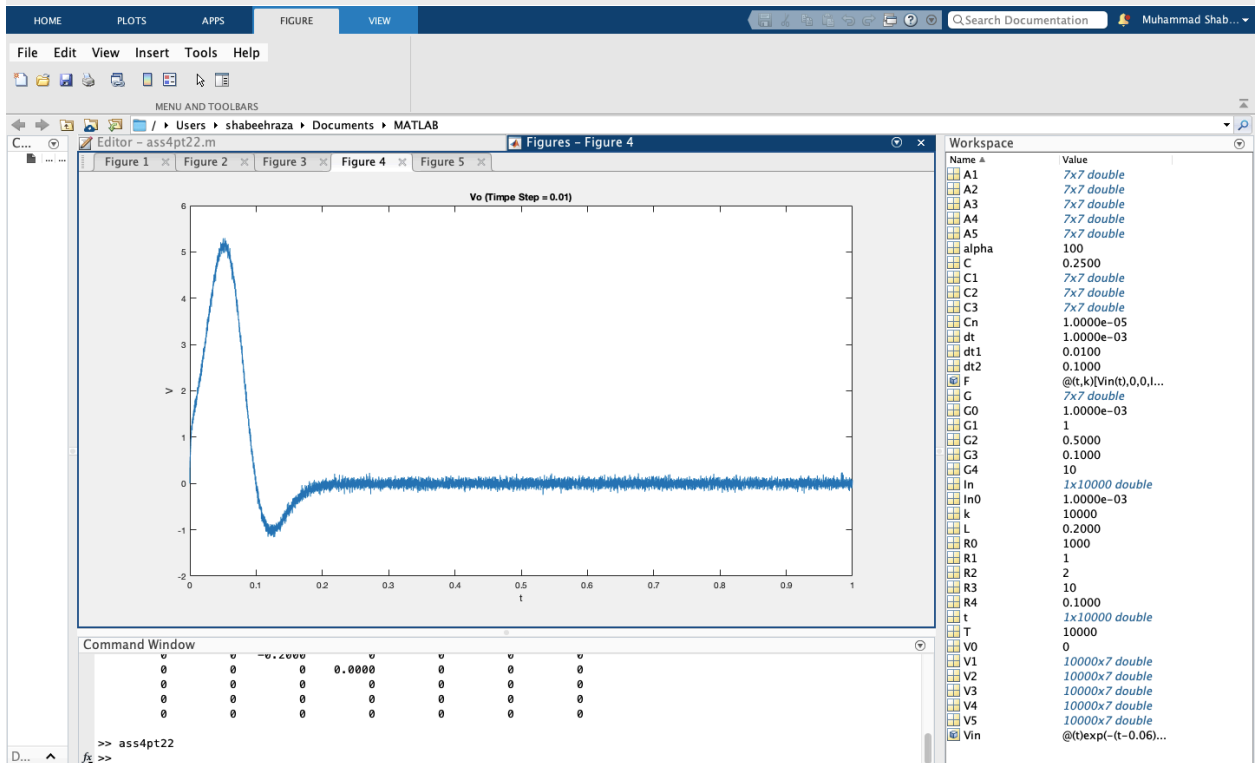
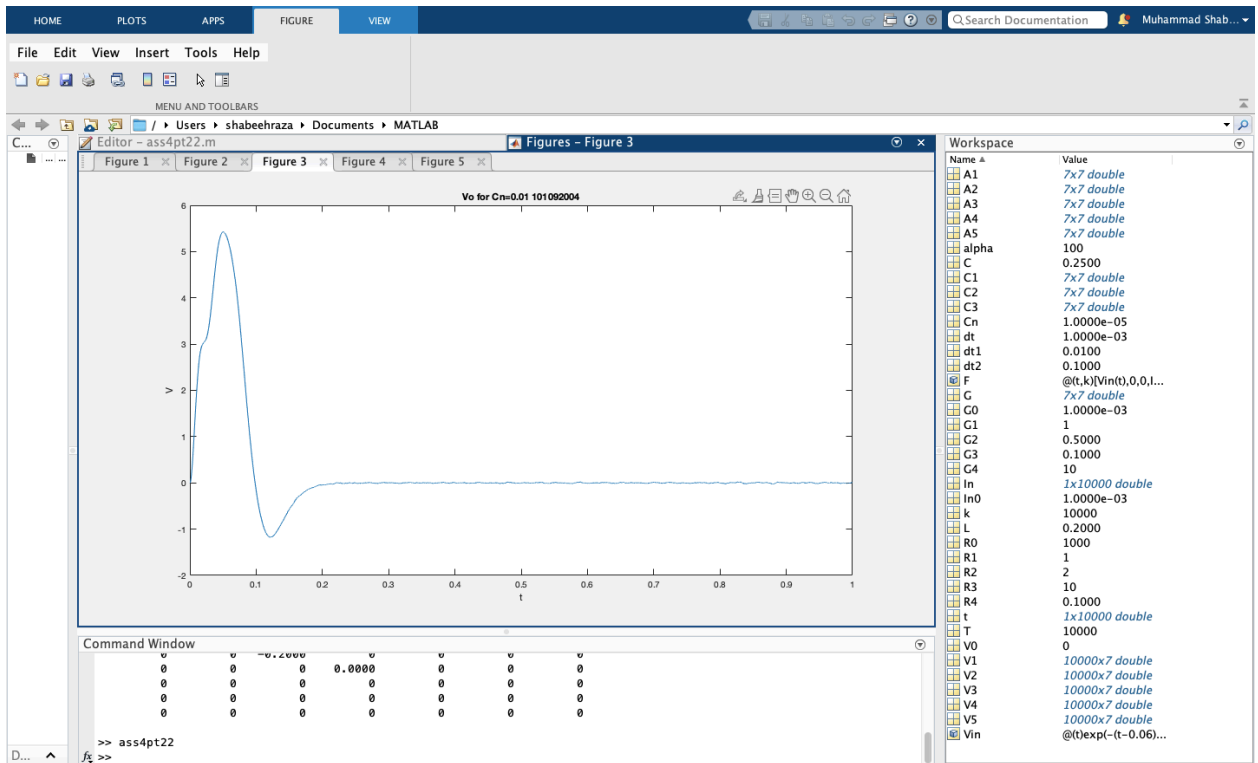
1.0000	0	0	0	0	0	0
-0.5000	1.5000	-1.0000	0	0	0	0
0	1.0000	0	-1.0000	0	0	0
0	0	-1.0000	0.1000	0	0	0
0	0	0	0	-100.0000	1.0000	0
0	0	0	0.1000	-1.0000	0	0
0	0	0	0	0	-10.0000	10.0010

=

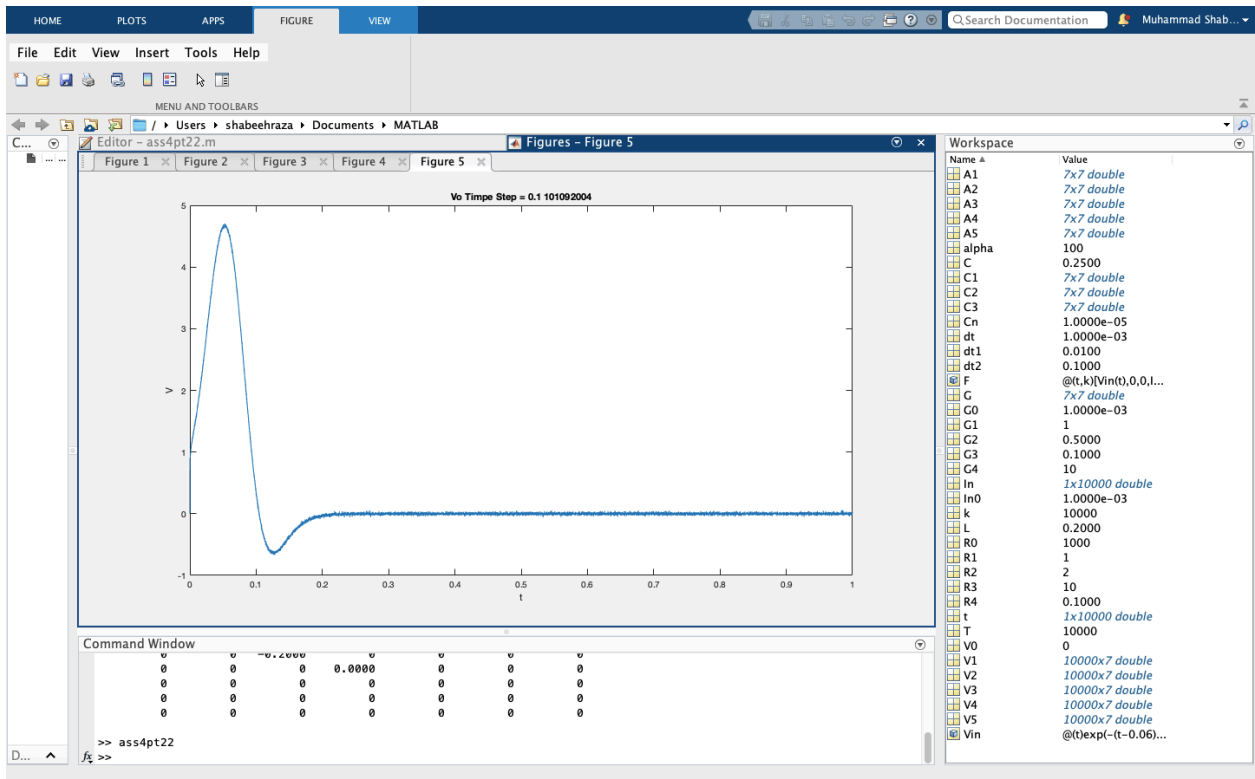
0	0	0	0	0	0	0
-0.2500	0.2500	0	0	0	0	0
0	0	-0.2000	0	0	0	0
0	0	0	0.0000	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0











### Part 3

If the circuit was modeled by the transconductance equation the voltage source on the output stage, a b matrix is needed to form the MNA equations

The simulations would to be altered to handle the non-linearity. A new column vector would be added, in order to deal with the non-linearity. The new vector would be added on the left of matrix equation such that a column  $B(V)$  and the system equation would change to the following