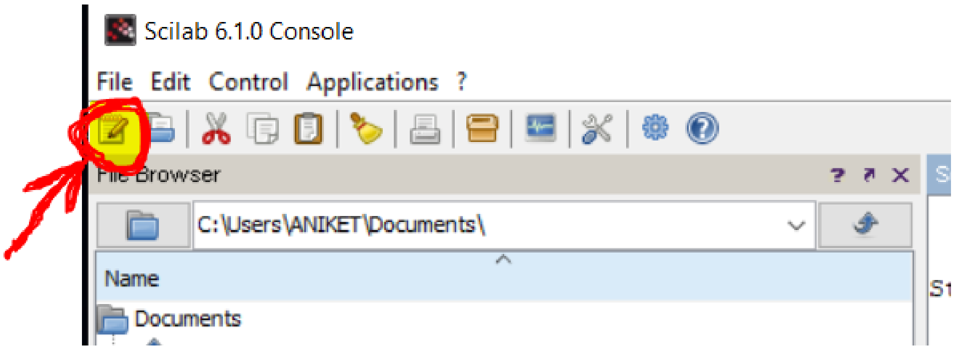
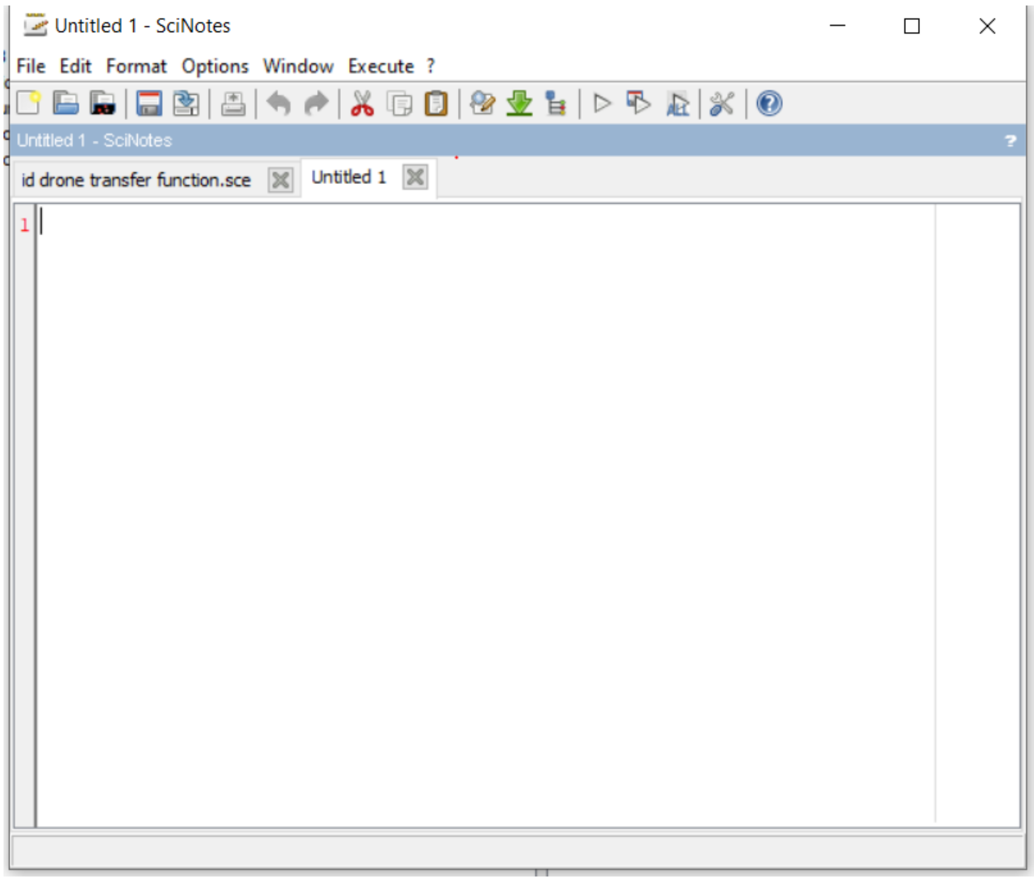
May 26, 2020

Task 3: Plot the Poles and Zeroes of Mass Damper System in Scilab

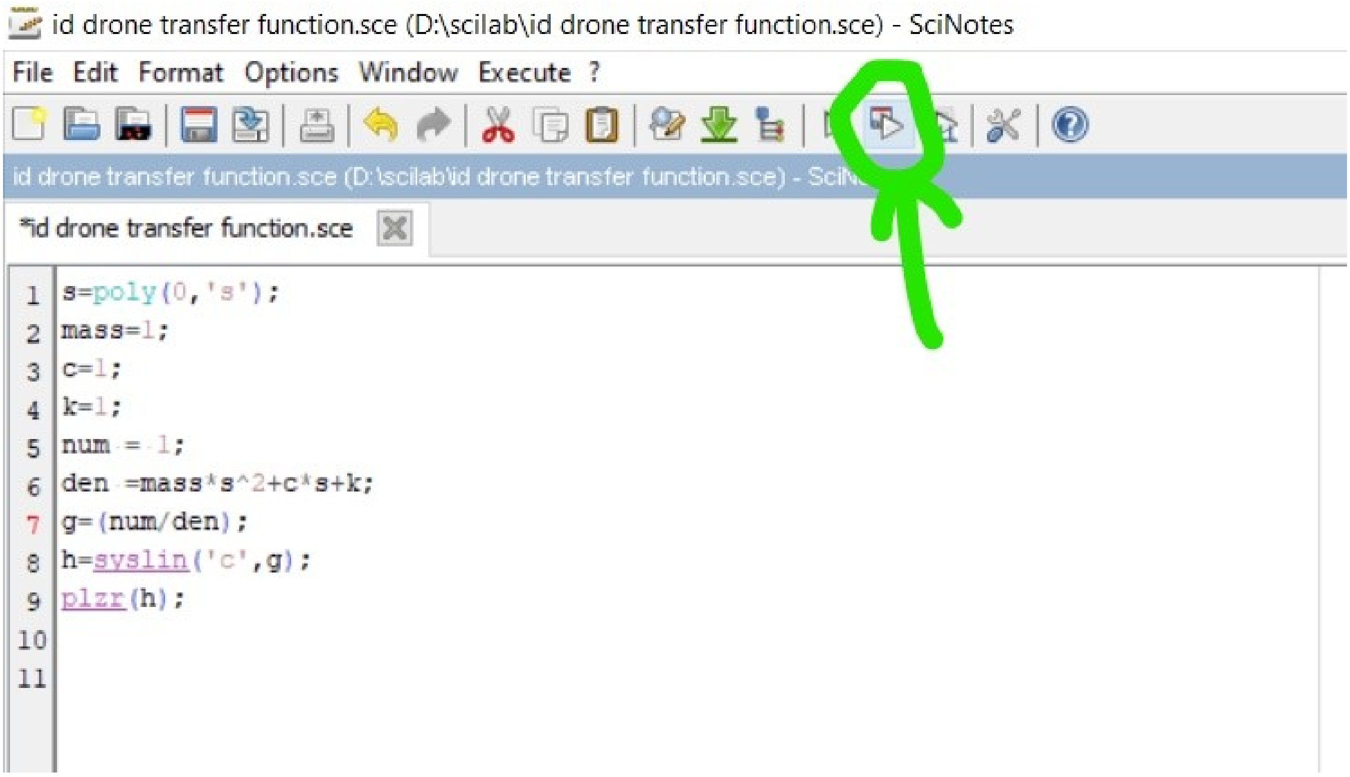
Step 1: For this task, open scilab software and click on the sci-notes option in the top left corner as shown in the image given below:-



Step 2. After clicking the sci-notes your window will be like this.........



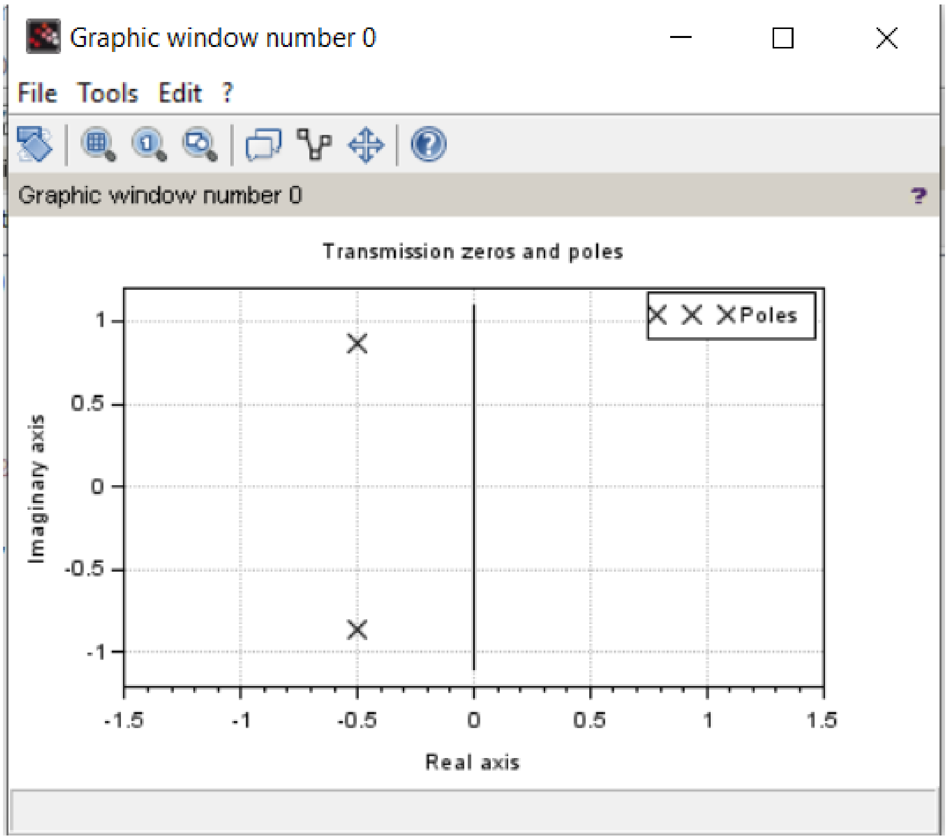
Step 3. Write code for the graph of poles and zeroes given below……



Explanation of the code line by line:-

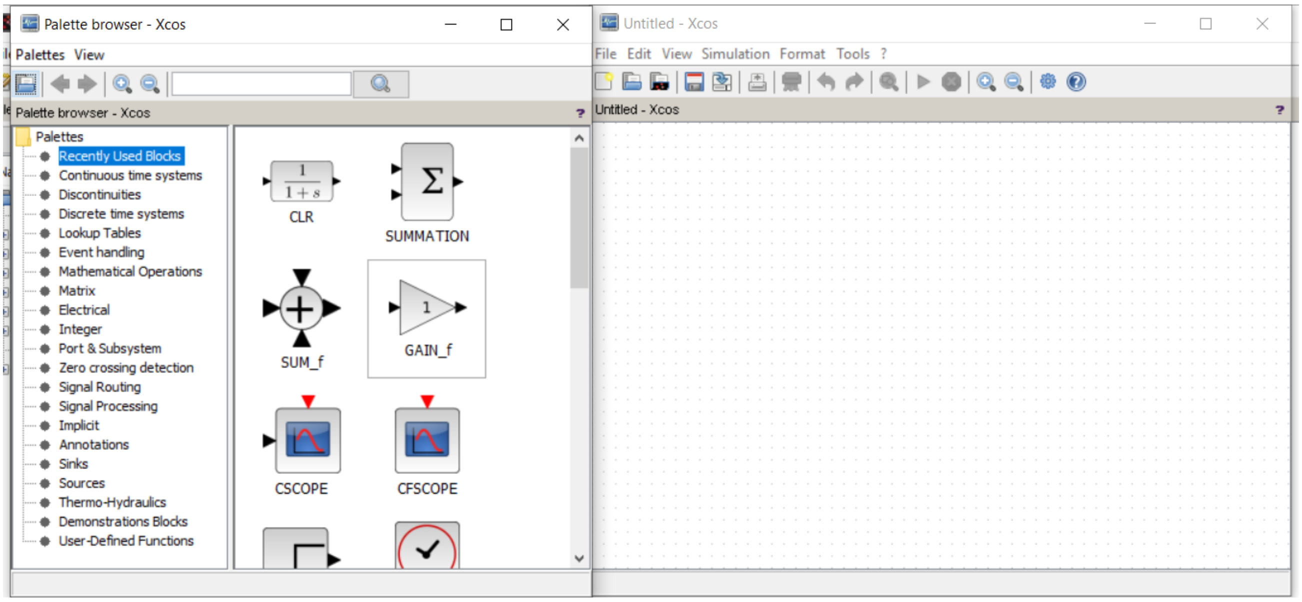
1. Poly() function in used to make polynomial in scilab.
2. Defining mass.
3. Defining Damping constant.
4. Defining Spring constant.
5. Numerator of the transfer function.
6. Denominator of the transfer function.
7. Transfer function g by dividing numerator and denominator.
8. Syslin() function is used for linear control system and solves it, it has two arguments first one is used for behaviour of input signal i.e. ‘d’ for discrete and ‘c’ for continuous and the other one is transfer function.
9. Plzr() is used to plot graph of poles and zeroes between real and imaginary axis.

If you save and execute the code by clicking on button shown in the above image. Then, the output of the system will be like this..



Task 4: Relate time domain analysis with position of poles with different damping factor and spring constant using Xcos.

Step 1. Open scilab and write xcos in console and press enter then, a new window will be open and look like this...



In the left side of the photo you can see the Paletts, through this You have to drag and drop various things to see the behaviour of the transfer function and its time characteristic.

1. From continuous time system import » CLR.

2. From sink import » CFSCOPE.

3. From sources import » TIME.

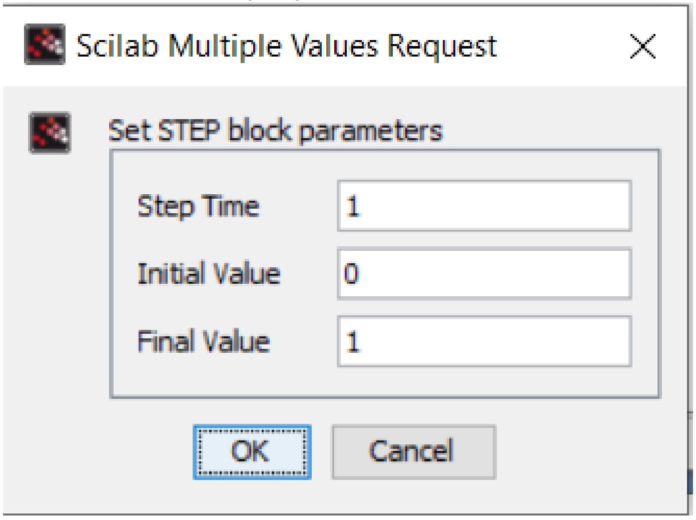
4. For input import » step input.

Define mass(m), damping constant(c), spring constant(k) in console window.

Double click on CLR function to set the numerator and denominator of the transfer function and press ok.

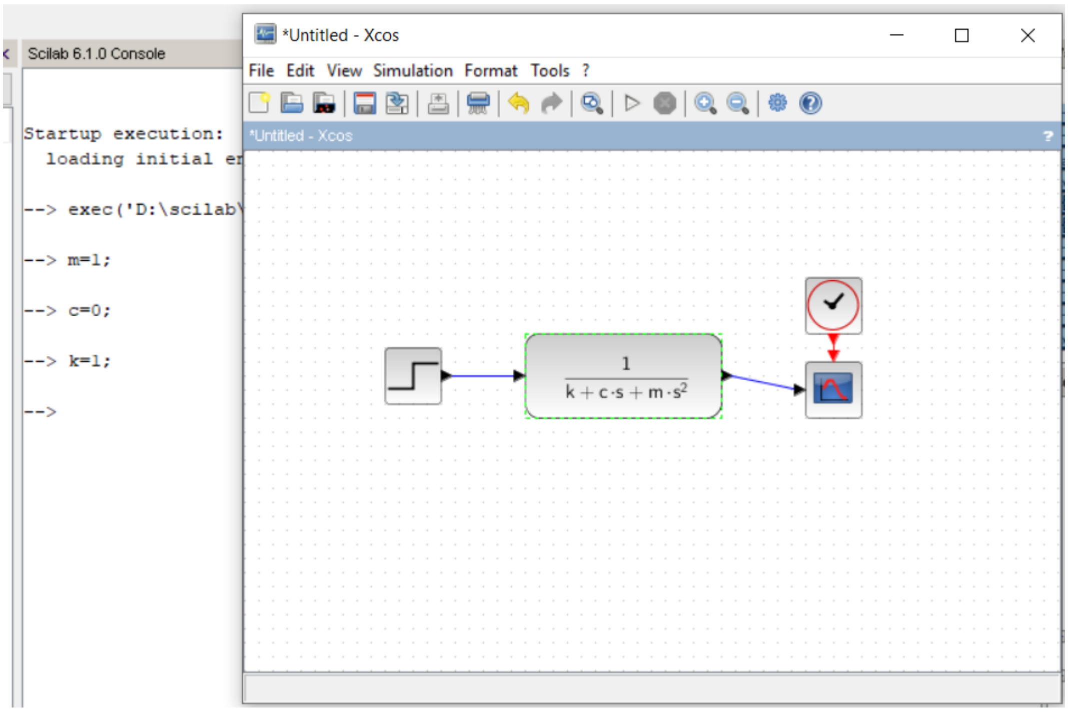
Double click on scope to set its value for unit step input, set Ymin =0 and Ymax=2 .

Double click on step input to set the final value to 1……

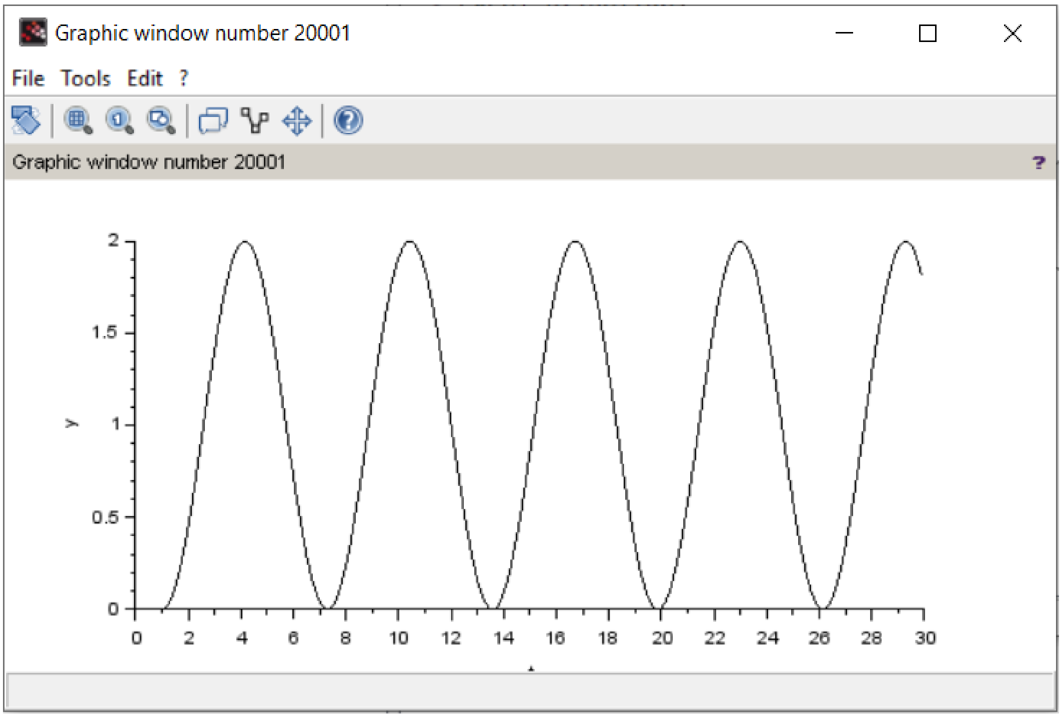


Set all values initial and final and at what time it should attain its value.

Connect all by joining lines.



Run the simulation to see the output......



For damping constant =0 , output is...

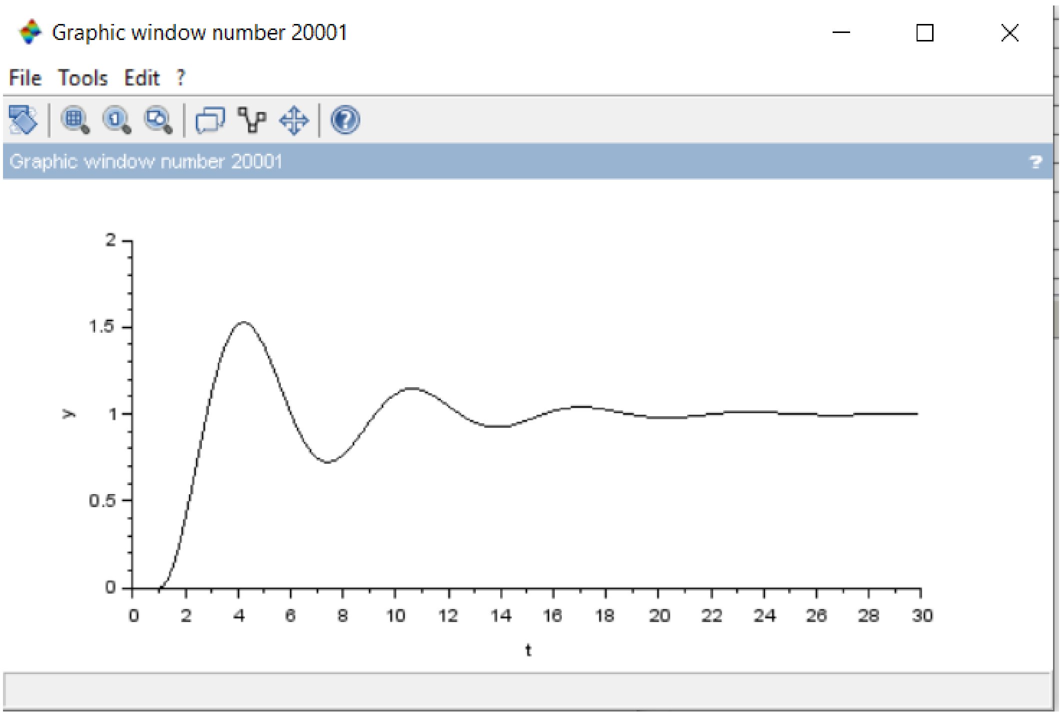


Figure 1: For c=0.4

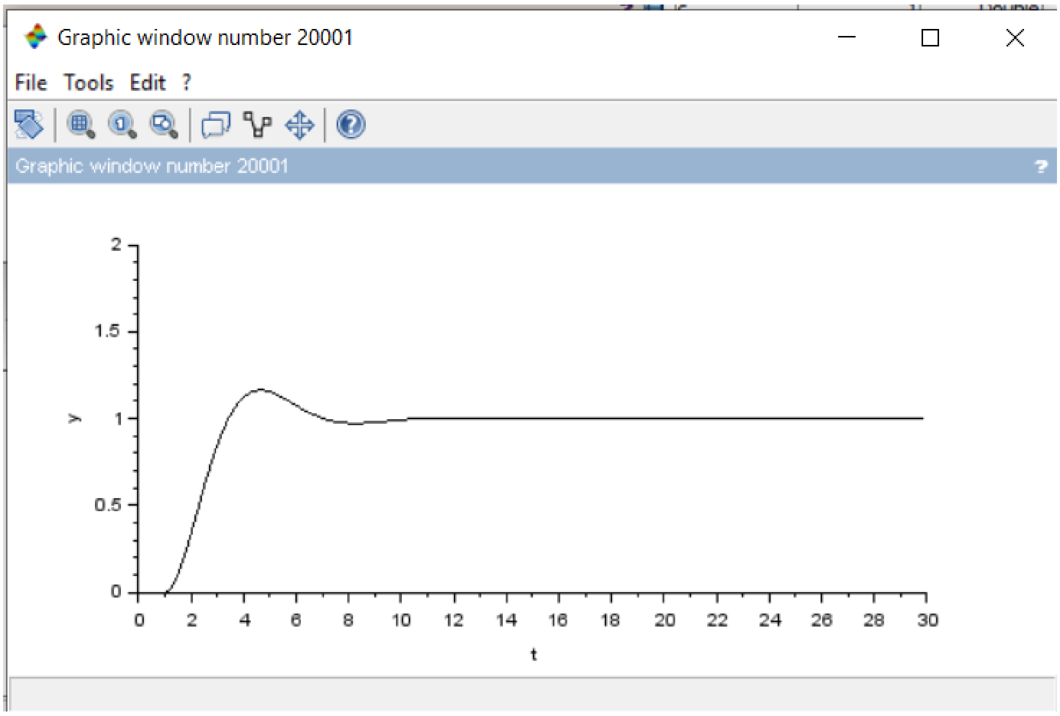


Figure 2: For c=1

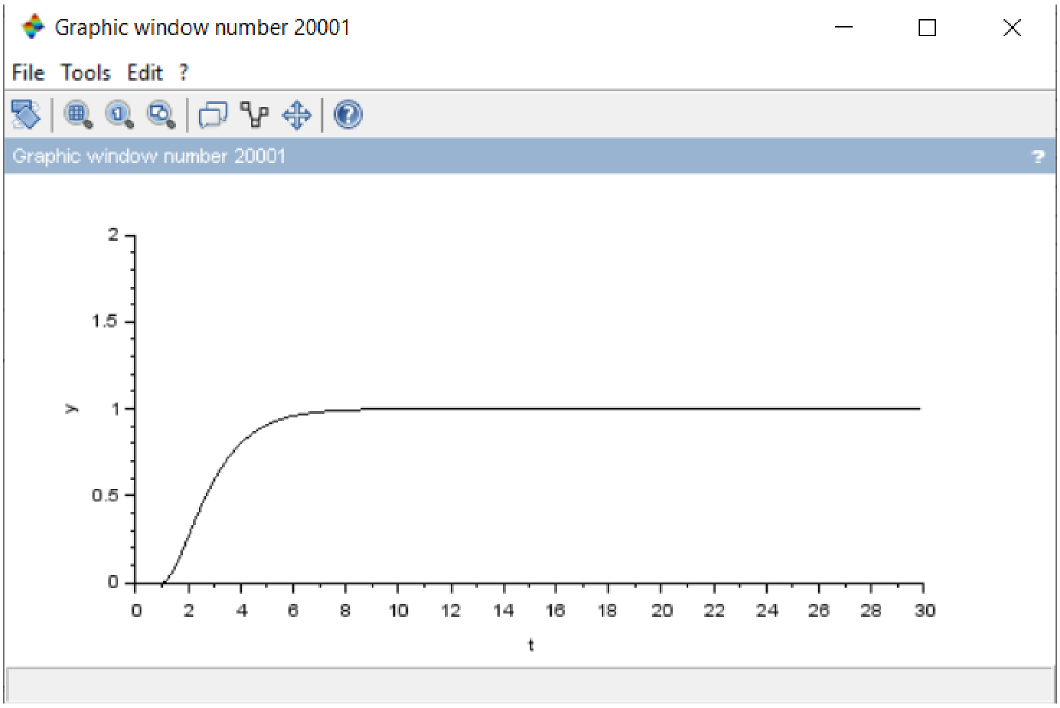
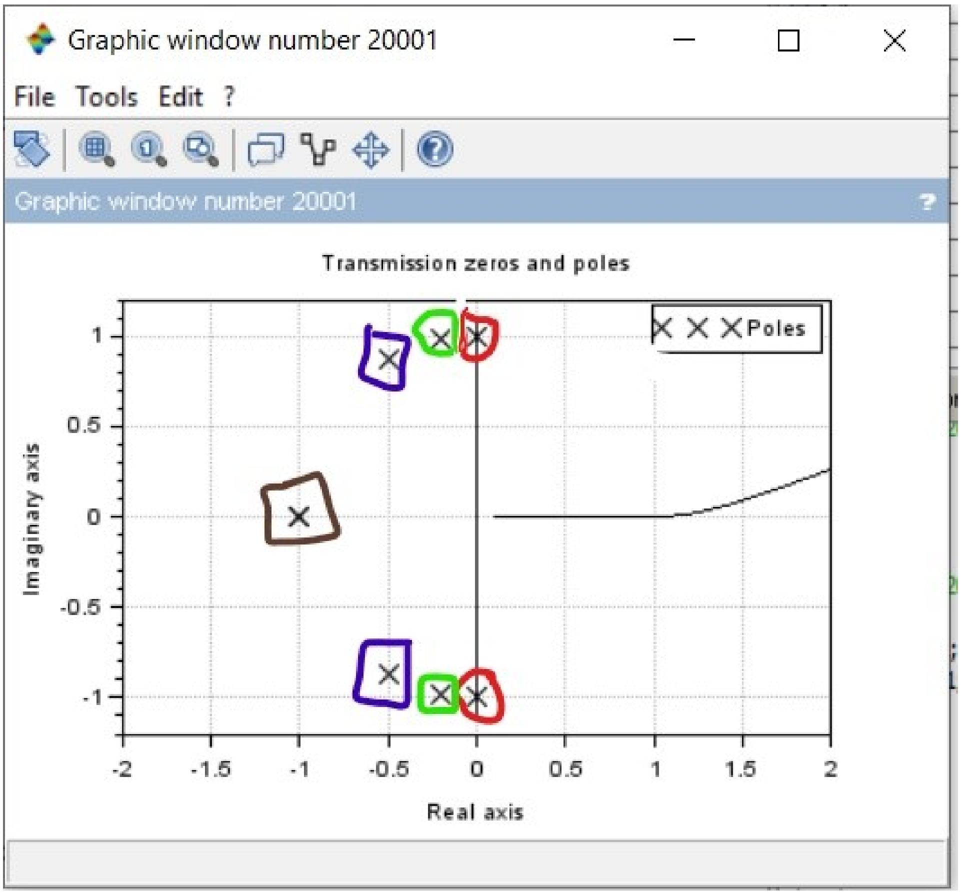


Figure 3: For c=2

POLE PLACEMENT RELATED TO DAMPING CONSTANT



Red color poles for c=0; Green color for c=0.4;

Blue color for c=1; and Brown for c=2.....