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Id: 120170672

Eng: Nael Dokhan

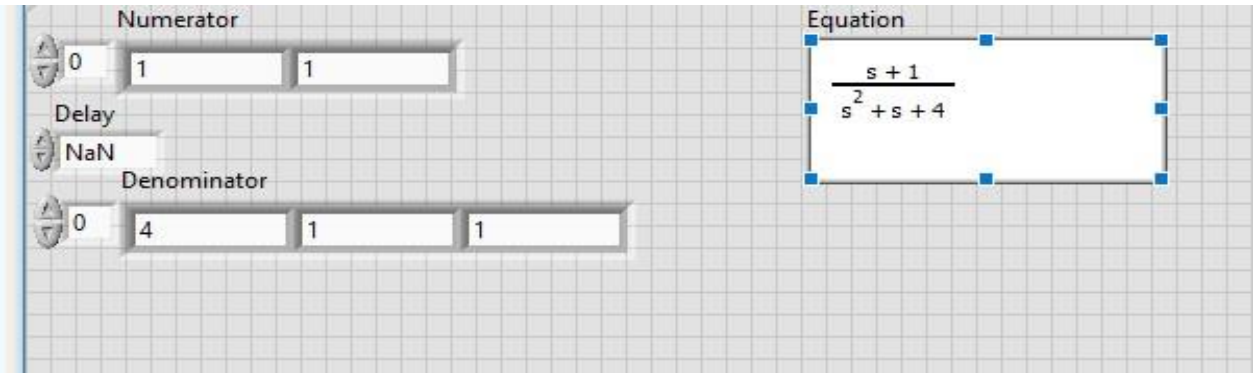
Lab 4

Q1: sol

matlab

```
>> G = tf ([1 1],[1 1 4])

G =

      s + 1
  -----------
  s^2 + s + 4

Continuous-time transfer function.
```

Labview



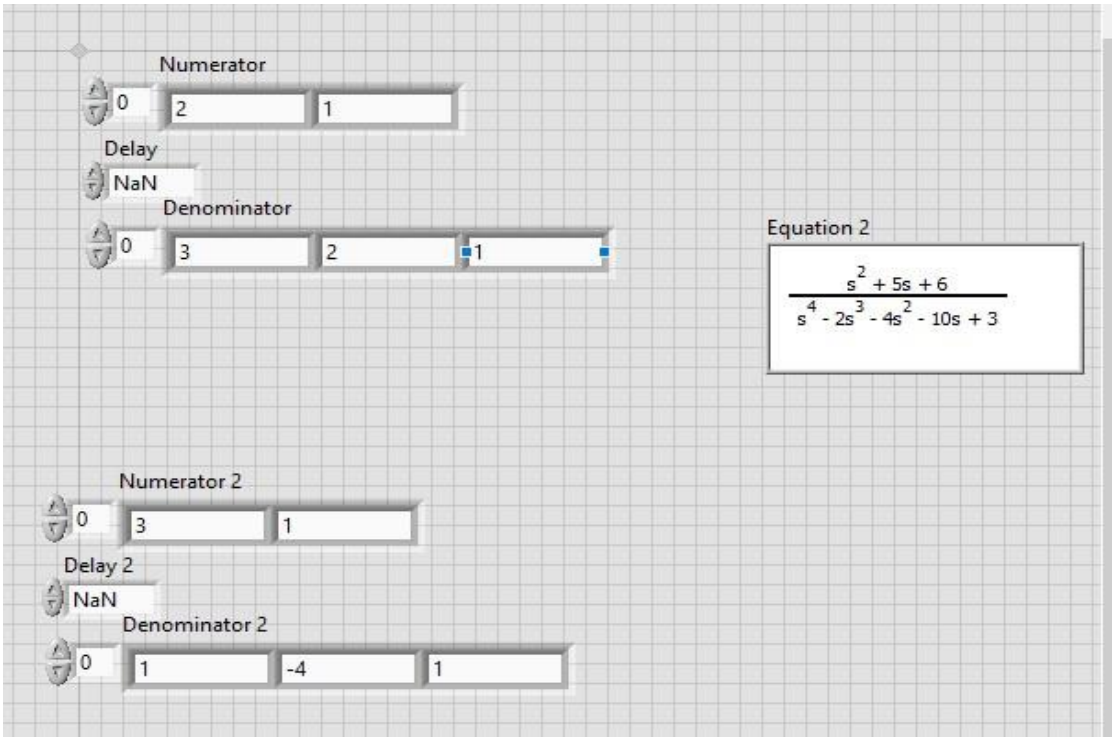
2)

Matlab

```
>> num1 =[1 2];
den1 =[1 2 3];
num2 =[1 3];
den2 =[1 -4 1];
[num ,den] =series(num1,den1,num2,den2)
G= tf(num,den)

num =

     0     0     1     5     6


den =

     1    -2    -4   -10     3


G =

          s^2 + 5 s + 6
  -------------------------------
  s^4 - 2 s^3 - 4 s^2 - 10 s + 3

Continuous-time transfer function.
```

labview

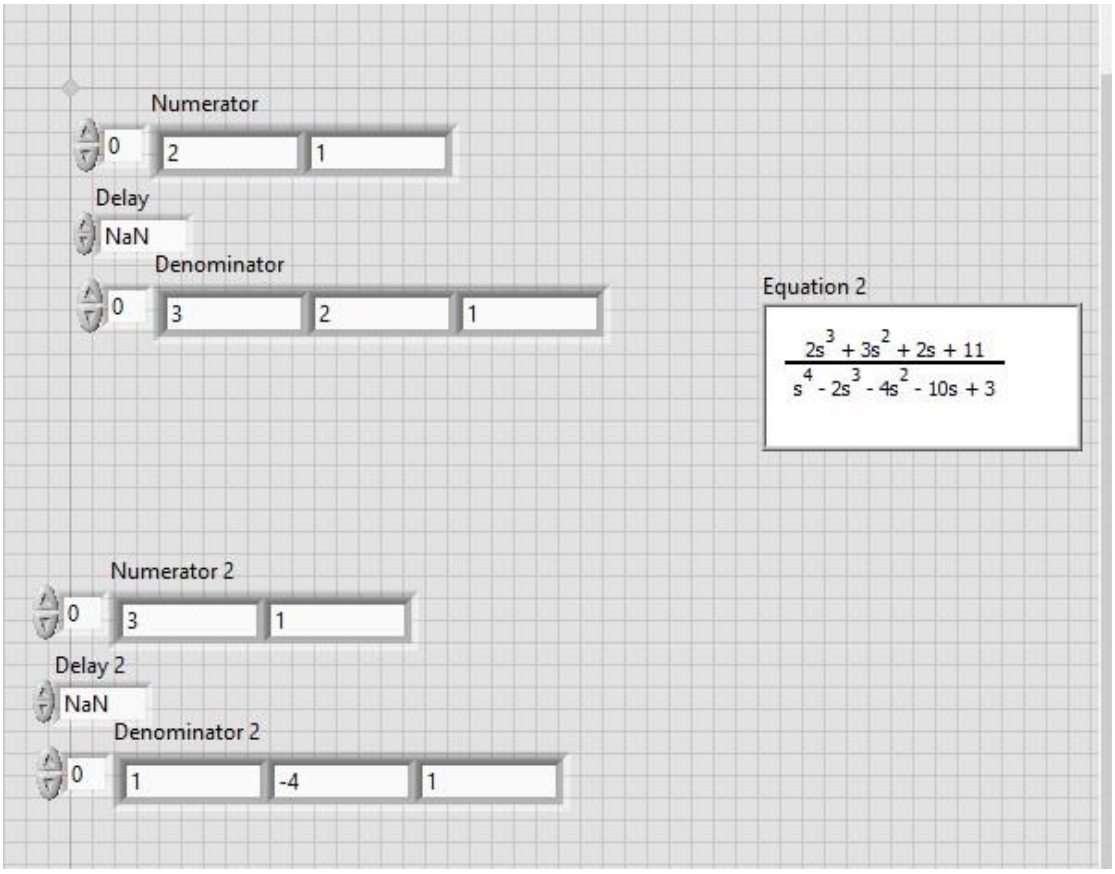
-



3)matlab

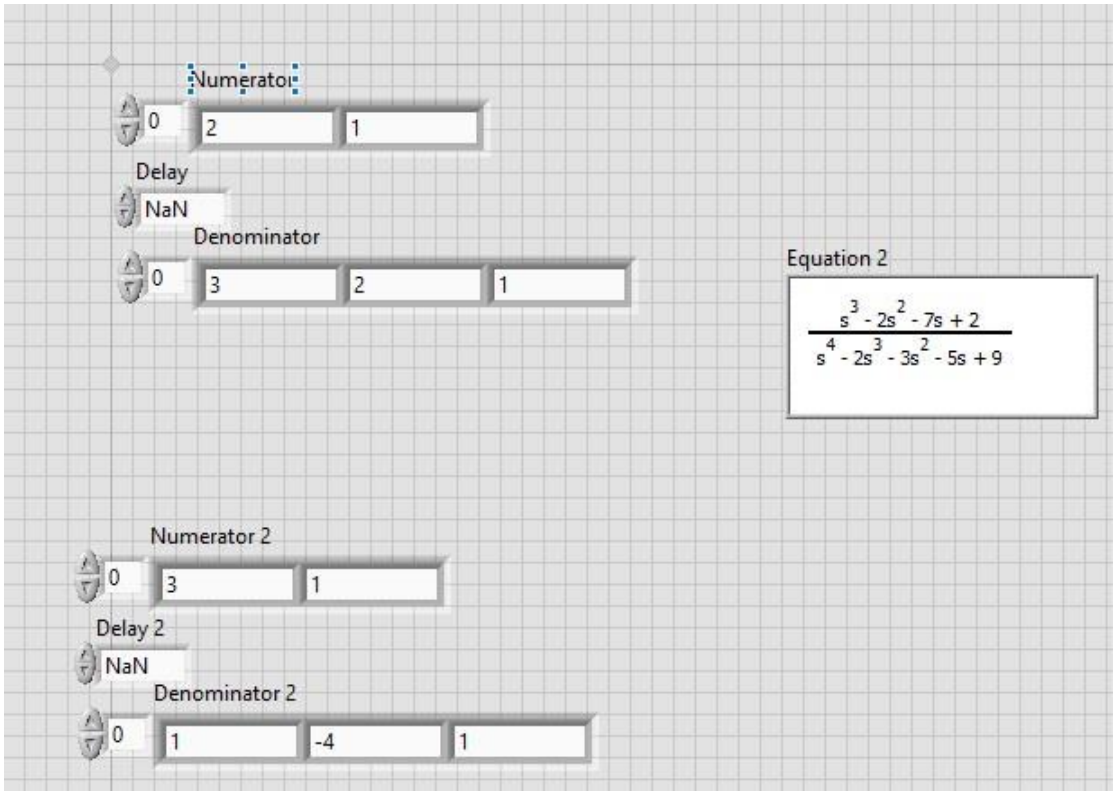
```
>> num1 =[1 2];
den1 =[1 2 3];
num2 =[1 3];
den2 =[1 -4 1];
[num ,den] =parallel(num1,den1,num2,den2)
G= tf(num,den)

num =

     0     2     3     2    11


den =

     1    -2    -4   -10     3


G =

     2 s^3 + 3 s^2 + 2 s + 11
  -----------------------------
  s^4 - 2 s^3 - 4 s^2 - 10 s + 3

Continuous-time transfer function.
```

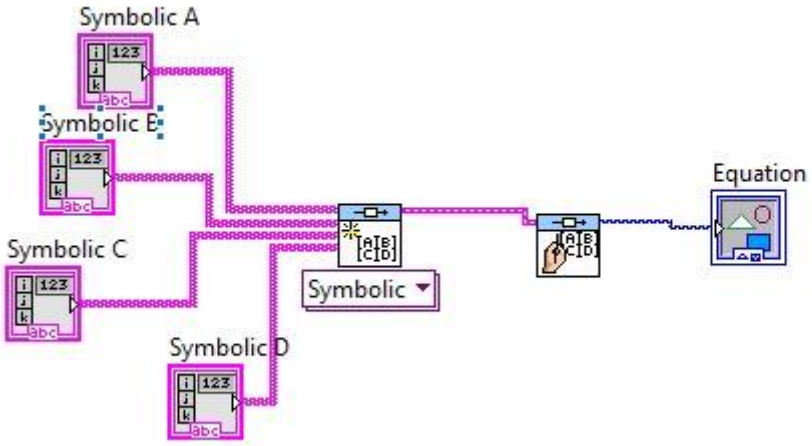
Labview

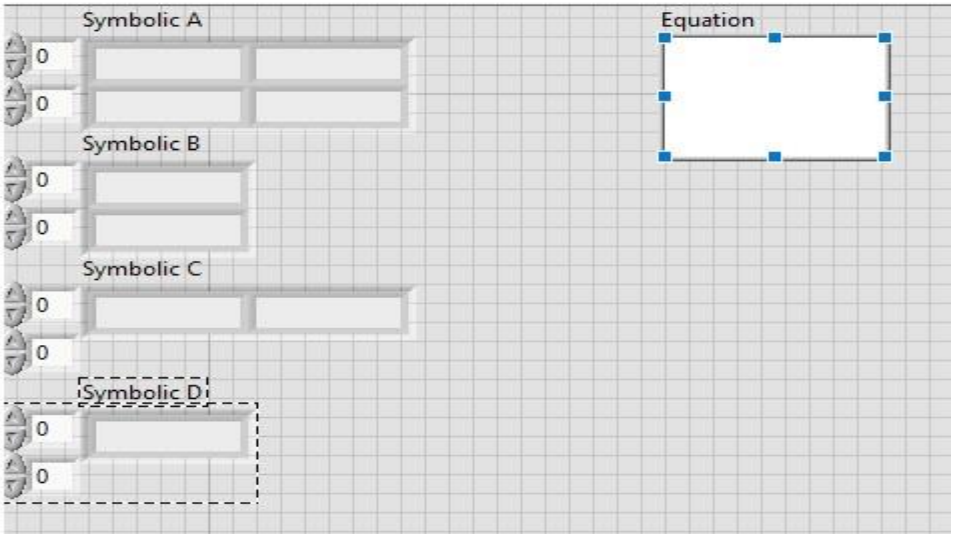


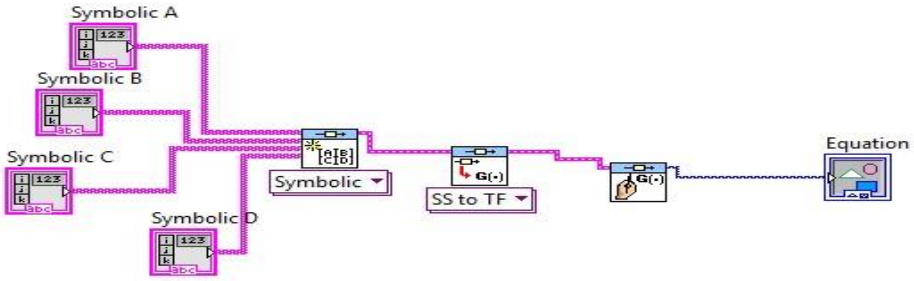
(4

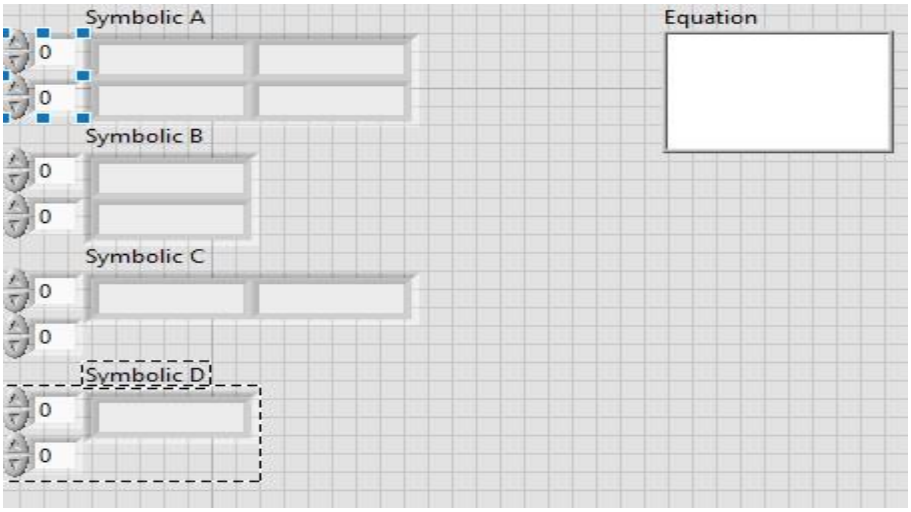
```
>> num1 =[1 2];
den1 =[1 2 3];
num2 =[1 3];
den2 =[1 -4 1];
[num ,den] =feedback(num1,den1,num2,den2,-1)
printsys(num,den)

num =

     0     1    -2    -7     2


den =

     1    -2    -3    -5     9


num/den =

        s^3 - 2 s^2 - 7 s + 2
   -----------------------------
   s^4 - 2 s^3 - 3 s^2 - 5 s + 9

>>
```

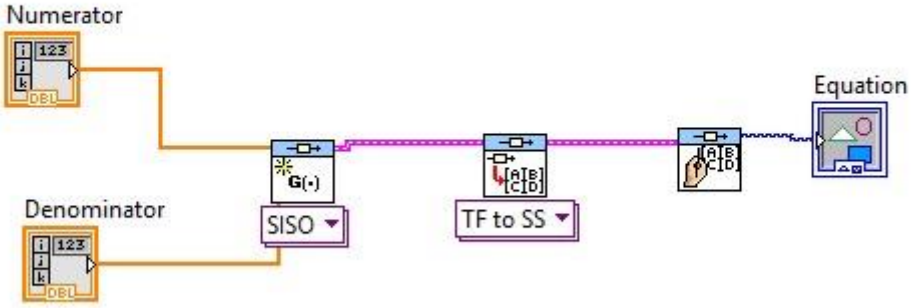


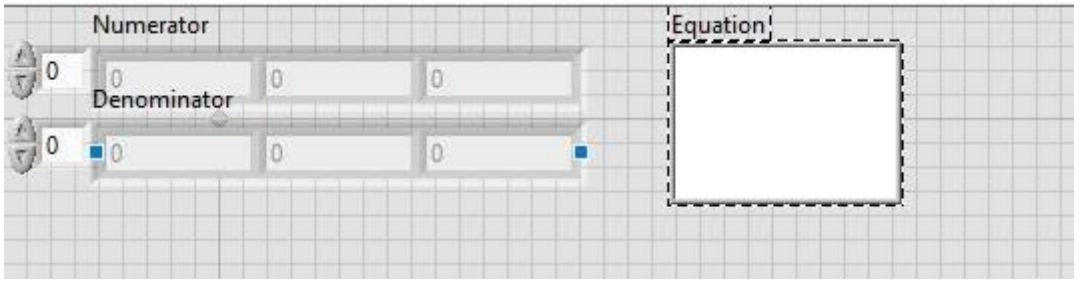

Symbolic A
Symbolic B
Symbolic C
Symbolic D
Symbolic
Equation


Symbolic A
Symbolic B
Symbolic C
Symbolic D
Equation
0


Symbolic A
Symbolic B
Symbolic C
Symbolic D
Symbolic
SS to TF
Equation

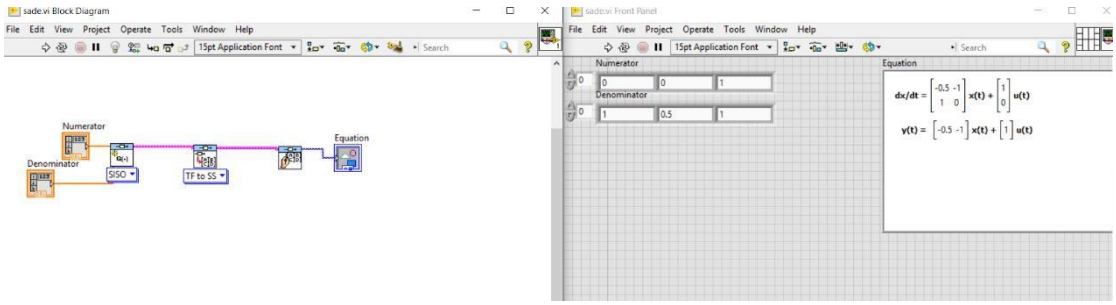

Symbolic A
Equation
Symbolic B
Symbolic C
Symbolic D

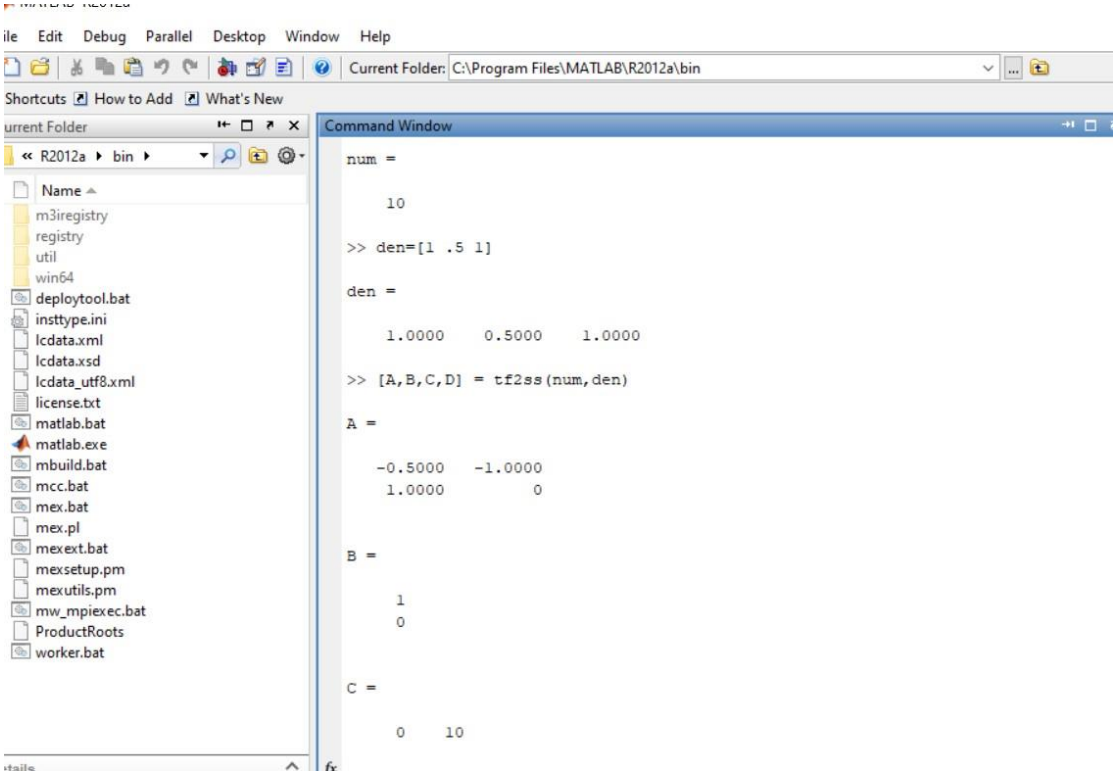

Numerator
Denominator
SISO
TF to SS
Equation


Numerator
Denominator
Equation

Q2:

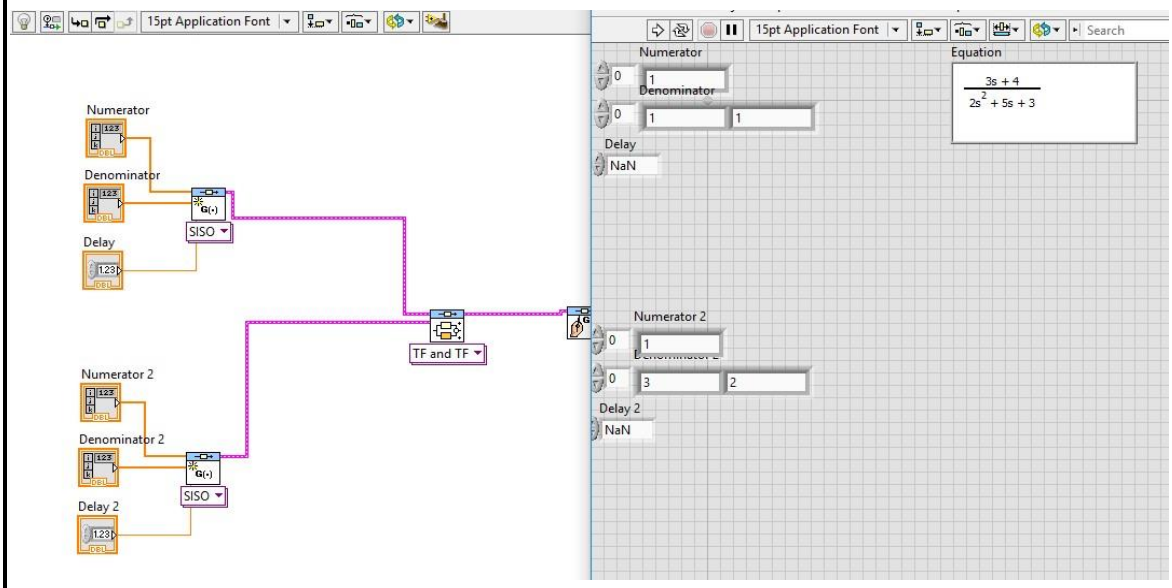
Sol:


sade.vi Block Diagram
File Edit View Project Operate Tools Window Help
15pt Application Font
Search
Numerator
Denominator
SISO
TF to SS
Equation
sade.vi Front Panel
File Edit View Project Operate Tools Window Help
15pt Application Font
Search
Numerator
Denominator
Equation
dx/dt = [-0.5 -1; 1 0] x(t) + [1; 0] u(t)
y(t) = [-0.5 -1] x(t) + [1] u(t)

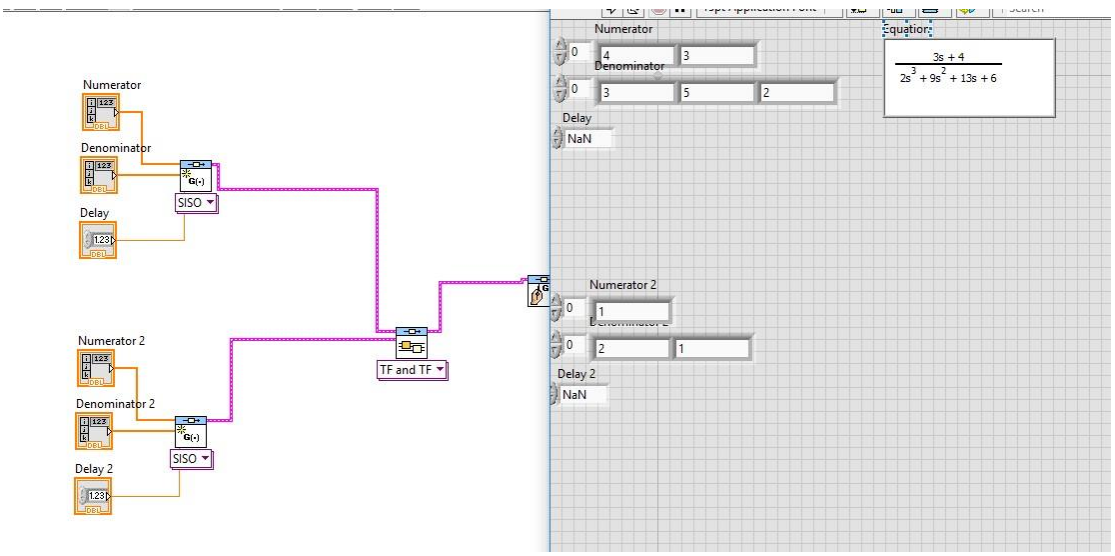

ile Edit Debug Parallel Desktop Window Help
Current Folder: C:\Program Files\MATLAB\R2012a\bin
Shortcuts How to Add What's New
urrent Folder
« R2012a ▸ bin ▸
Name
m3iregistry
registry
util
win64
deploytool.bat
insttype.ini
lcdata.xml
lcdata.xsd
lcdata_utf8.xml
license.txt
matlab.bat
matlab.exe
mbuild.bat
mcc.bat
mex.bat
mex.pl
mexext.bat
mexsetup.pm
mexutils.pm
mw_mpiexec.bat
ProductRoots
worker.bat
Command Window
num =
10
>> den=[1 .5 1]
den =
1.0000 0.5000 1.0000
>> [A,B,C,D] = tf2ss(num,den)
A =
-0.5000 -1.0000
1.0000 0
B =
1
0
C =
0 10

```
>> num1 =[1];den1 =[1 1];
num2 =[1];den2 =[2 3];
[num3,den3] =parallel(num1,den1,num2,den2);
G1 =tf(num3,den3);
num3 =[3 4];den3=[2 5 3];
[num4,den4] =series(num3,den3,[1],[1 2]);
[num,den]=feedback(num4,den4,[1],[1],1);
[num,den]=feedback(num,den,[1],[1],1)
printsys(num,den);
G =tf2ss(num,den)

num =

     0     0     3     4


den =

     2     9     7    -2


num/den =

            3 s + 4
   -----------------------
   2 s^3 + 9 s^2 + 7 s - 2

G =

   -4.5000   -3.5000    1.0000
    1.0000         0         0
         0    1.0000         0
```

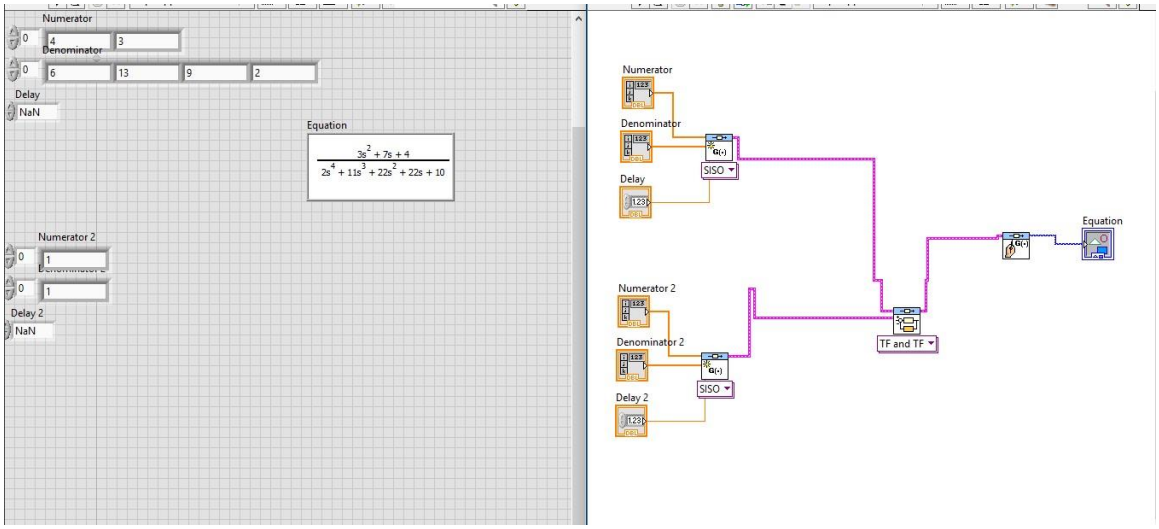
Step 1; parallel



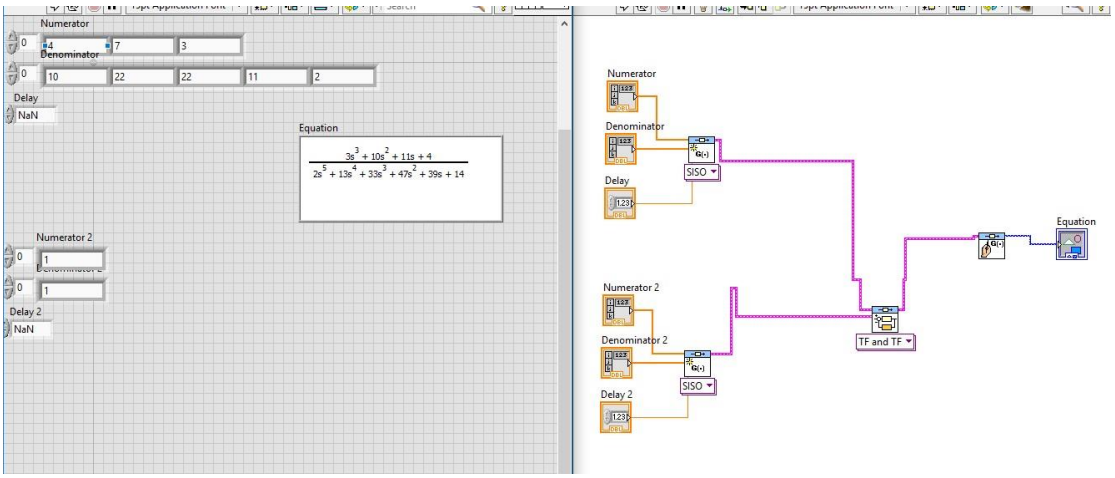
Step2 ;series

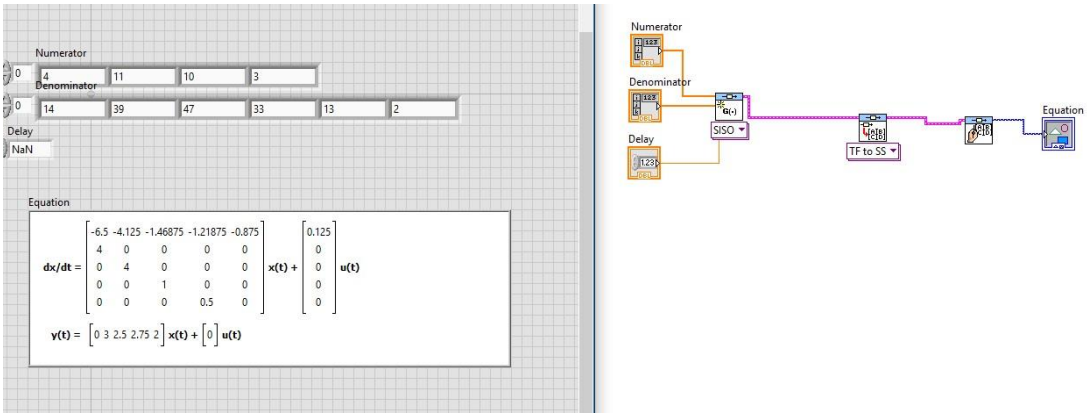


Step 3 :feedback



Step 4:feedback





Equation

$$\frac{3s^3 + 10s^2 + 11s + 4}{2s^5 + 13s^4 + 33s^3 + 47s^2 + 39s + 14}$$

Equation

$$\mathbf{dx/dt} = \begin{bmatrix} -6.5 & -4.125 & -1.46875 & -1.21875 & -0.875 \\ 4 & 0 & 0 & 0 & 0 \\ 0 & 4 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0.5 & 0 \end{bmatrix} \mathbf{x(t)} + \begin{bmatrix} 0.125 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} \mathbf{u(t)}$$

$$\mathbf{y(t)} = \begin{bmatrix} 0 & 3 & 2.5 & 2.75 & 2 \end{bmatrix} \mathbf{x(t)} + \begin{bmatrix} 0 \end{bmatrix} \mathbf{u(t)}$$