

Islamic University of Gaza		Linear control system lab
Faculty of Engineering		HW#6
Electrical Engineering Department		Eng. Nael Dokhan

<i>NAME</i>	<i>Jaafar wael Jaafar</i>
<i>ID</i>	<i>120180534</i>
<i>NAME</i>	<i>Mahmoud Jaafar</i>
<i>ID</i>	<i>120180521</i>

Control Systems

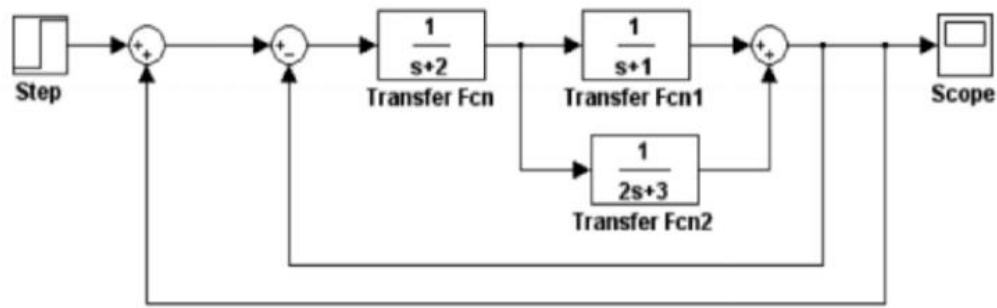
HOMEWORK(6)

LAB 7

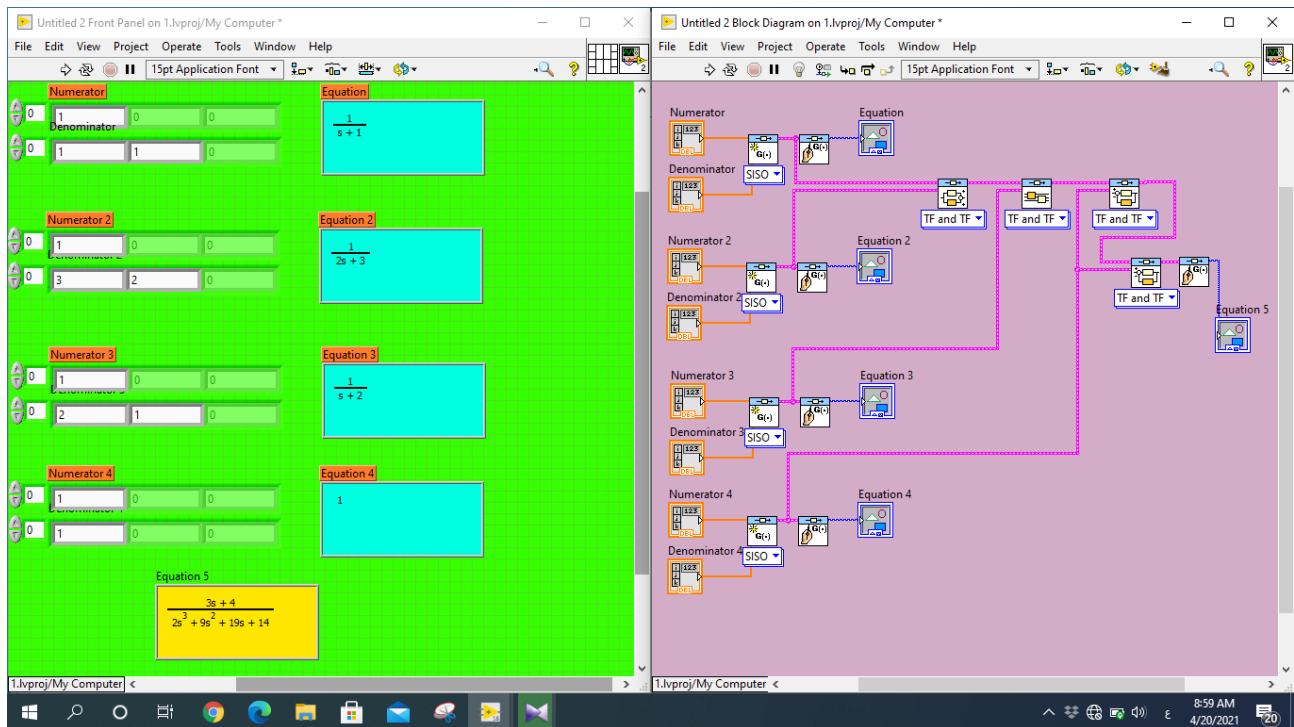
Question: For the given system described in the figure, using MATLAB code and Labview perform the following tasks. (Use series, parallel, feedback and tf2ss commands only).

- Find the transfer function of the system.
- Then, find the state-space of the system.

i.



a) Transfer function: _



Untitled 2 Front Panel on 1.lvproj/My Computer

File Edit View Project Operate Tools Window Help

15pt Application Font

Numerator

0 1 0 0

Denominator

0 1 1 0

Equation

$$\frac{1}{s+1}$$

Numerator 2

0 1 0 0

Denominator

0 3 2 0

Equation 2

$$\frac{1}{2s+3}$$

Numerator 3

0 1 0 0

Denominator

0 2 1 0

Equation 3

$$\frac{1}{s+2}$$

Numerator 4

0 1 0 0

Denominator

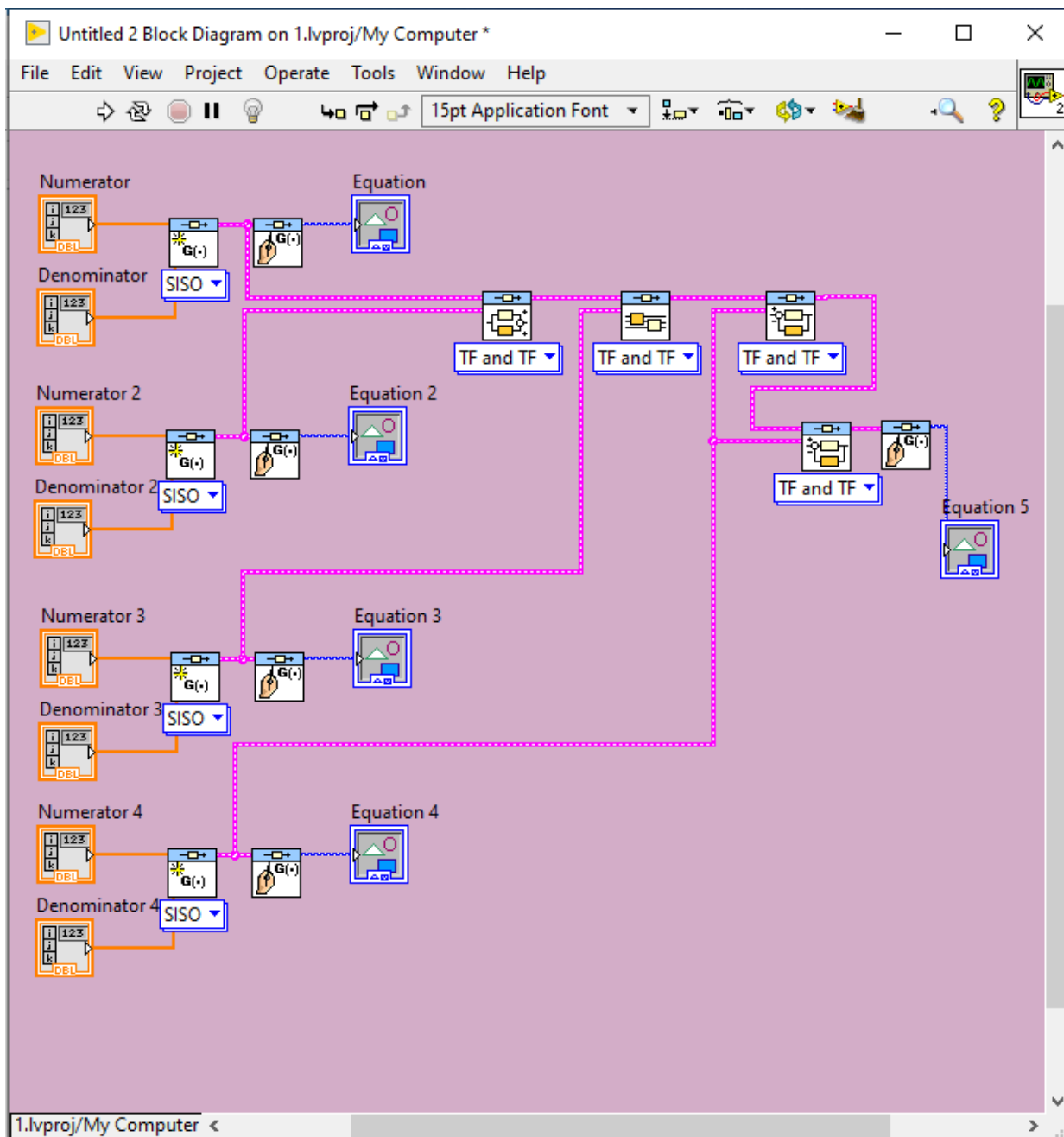
0 1 0 0

Equation 4

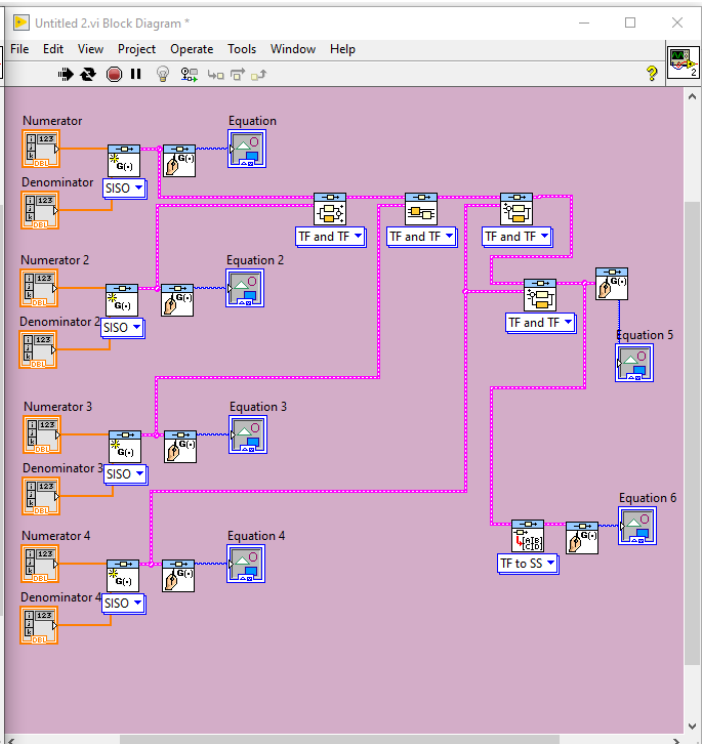
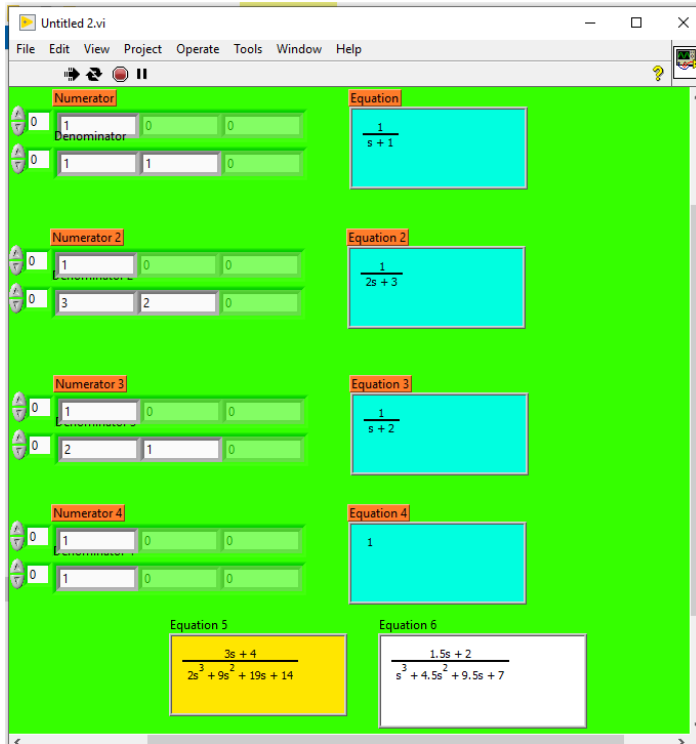
$$1$$

Equation 5

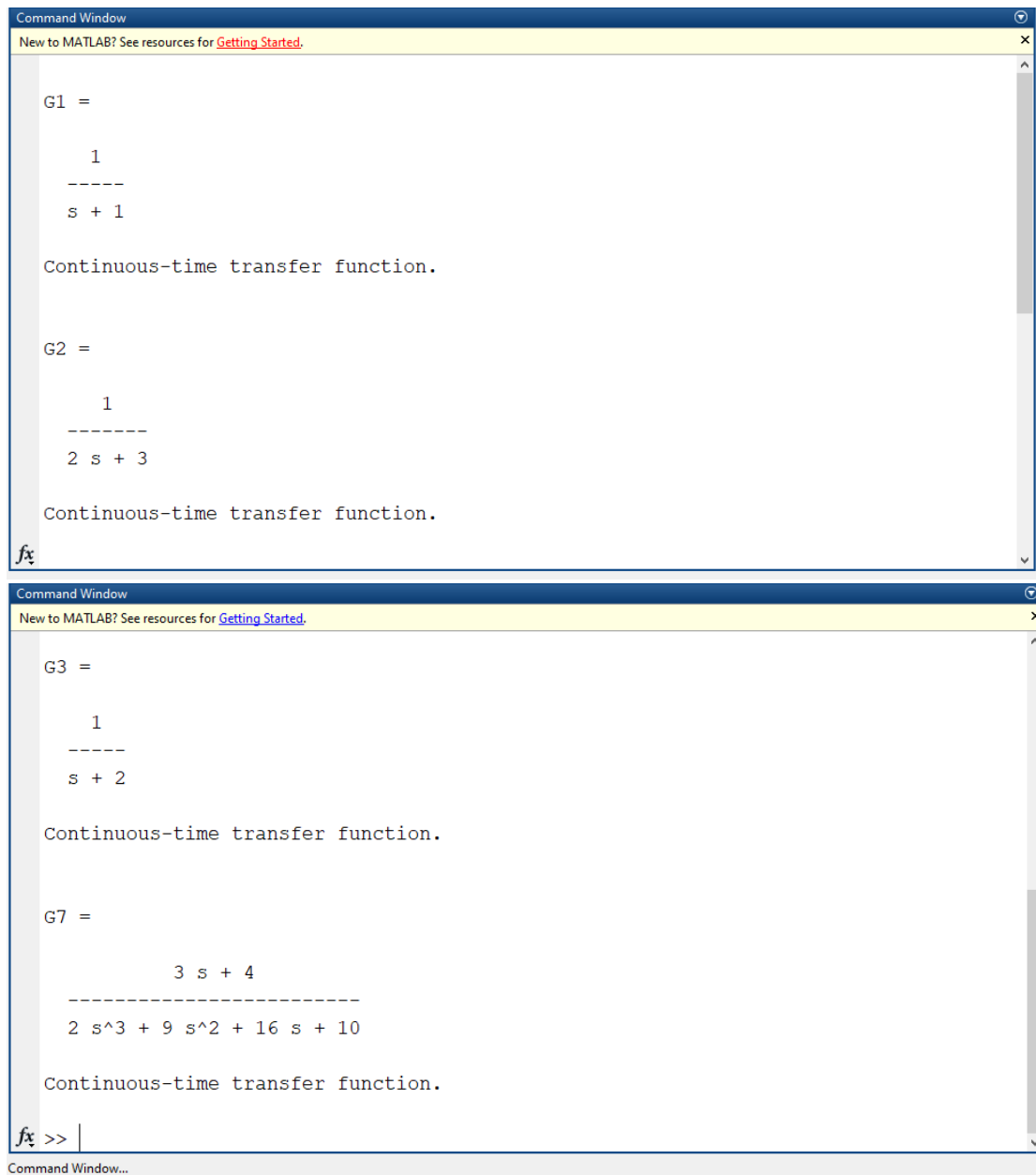
$$\frac{3s+4}{2s^3+9s^2+19s+14}$$



b) State Space



Solution for matlab



The image displays two screenshots of the MATLAB Command Window, showing the definition of three continuous-time transfer functions: G1, G2, and G3.

Top Screenshot:

```
Command Window
New to MATLAB? See resources for Getting Started.

G1 =

    1
  ----
  s + 1

Continuous-time transfer function.

G2 =

    1
  -----
  2 s + 3

Continuous-time transfer function.

fx
```

Bottom Screenshot:

```
Command Window
New to MATLAB? See resources for Getting Started.

G3 =

    1
  ----
  s + 2

Continuous-time transfer function.

G7 =

    3 s + 4
  -----
  2 s^3 + 9 s^2 + 16 s + 10

Continuous-time transfer function.

fx >> |
```

Command Window...

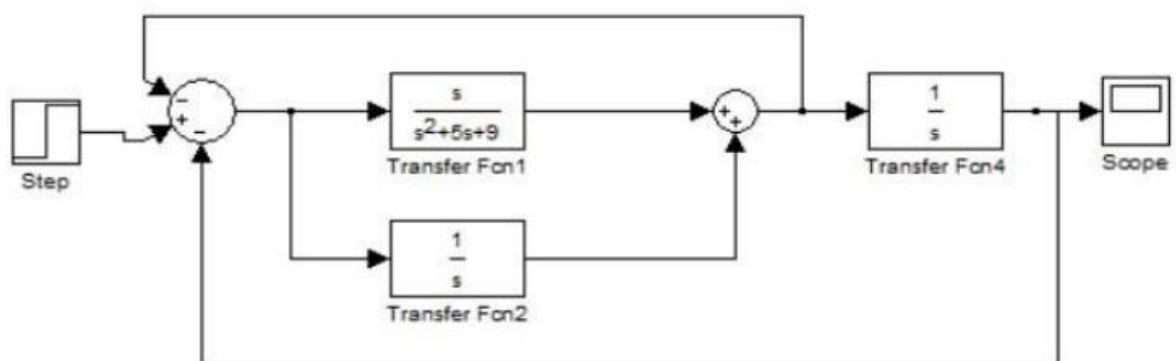
```

*Untitled
EDITOR PUBLISH VIEW
New Open Save Find Files Compare Print Go To Find Comment % Indent Breakpoints Run Run and Advance Run and Time
FILE NAVIGATE EDIT BREAKPOINTS RUN

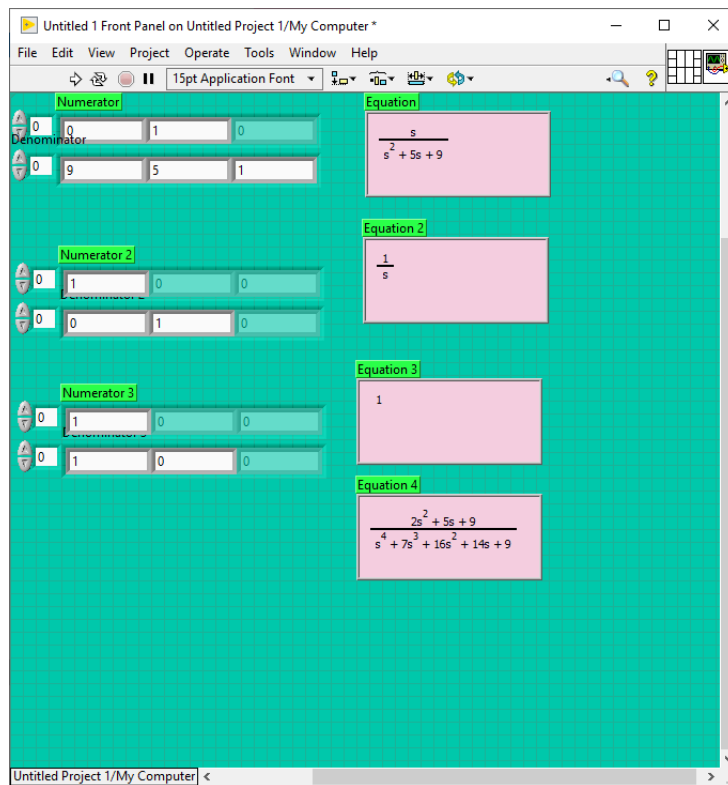
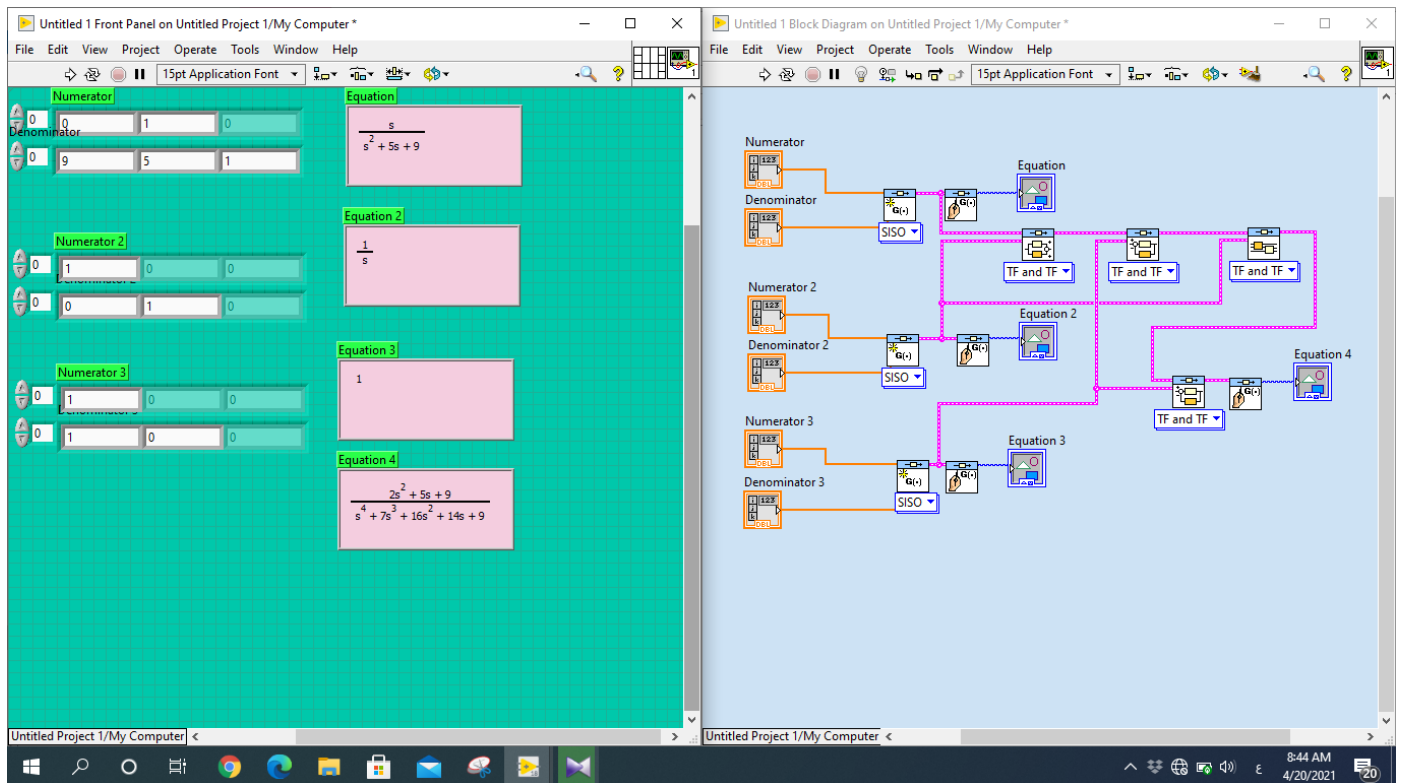
1 clear
2 clc
3 num1=1;
4 den1=[1 1];
5 G1=tf(num1,den1)
6 num2=1;
7 den2=[2 3];
8 G2=tf(num2,den2)
9 num3=1;
10 den3=[1 2];
11 G3=tf(num3,den3)
12
13 G4=parallel(G1,G2);
14 G5=series(G4,G3);
15 G6=feedback(G5,1);
16 G7=series(G6,1)
17

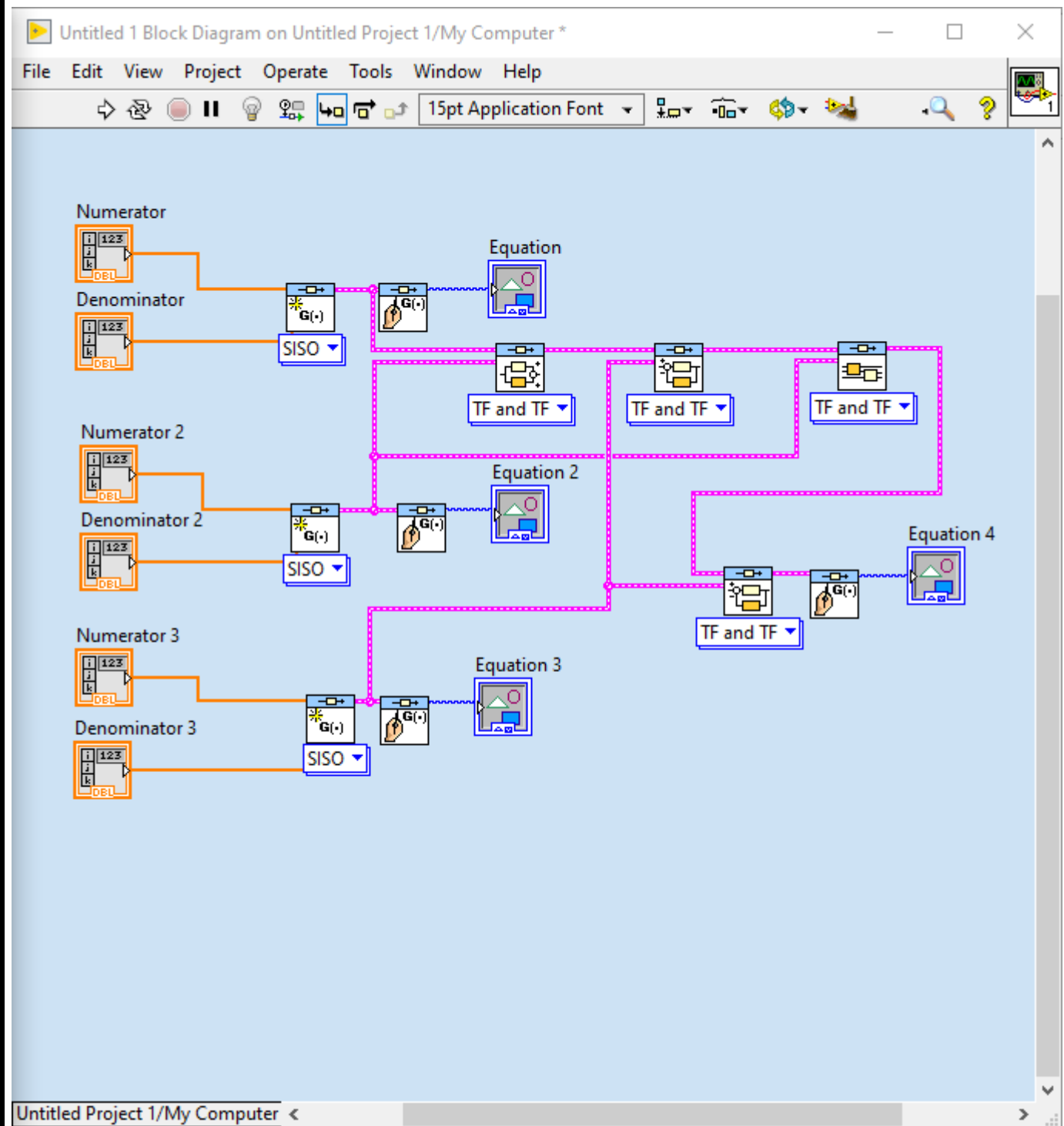
```

ii.



a) Transfer function: _





b) State Space

Solution for matlab

The screenshot shows the MATLAB R2015a desktop environment. The Command Window displays the following code and its output:

```
>> num1=[1 0];  
den1=[1 5 9];  
G1=tf(num1,den1);  
num2=1;  
den2=[1 0];  
G2=tf(num2,den2);  
  
G3=parallel(G1,G2);  
G4=feedback(G3,1);  
G5=series(G4,G2);  
G6=feedback(G5,1)  
  
G6 =  
  
          2 s^2 + 5 s + 9  
-----  
s^4 + 7 s^3 + 16 s^2 + 14 s + 9  
  
Continuous-time transfer function
```

The Workspace window shows the following variables:

Name	Value
den1	[1,5,9]
den2	[1,0]
G1	1x1 tf
G2	1x1 tf
G3	1x1 tf
G4	1x1 tf
G5	1x1 tf
G6	1x1 tf
num1	[1,0]
num2	1

The Command History window shows the following commands:

```
den1=[1 5 9];  
G1=tf(num1,de...  
num2=1;  
den2=[1 0];  
G2=tf(num2,de...  
G3=parallel(G...  
G4=feedback(G...  
G5=series(G4,...  
G6=feedback(G...
```

The screenshot shows the MATLAB Editor window with the following code:

```
1 num1=[1 0];  
2 den1=[1 5 9];  
3 G1=tf(num1,den1);  
4 num2=1;  
5 den2=[1 0];  
6 G2=tf(num2,den2);  
7  
8 G3=parallel(G1,G2);  
9 G4=feedback(G3,1);  
10 G5=series(G4,G2);  
11 G6=feedback(G5,1)  
12
```

